May 1983

An independent magazine published by ECC Publications

sinclair user

Issue No 14

Only 75p

SAVE MONEY WITH OUR GROWING USER CLUB

Clive surprises business students

We look inside Sinclair's new offices

Spectrum's colourful rival reviewed

We reveal better ZX-81 graphics

How to get away from Basic language

We return to the land of the Hobbit

BIGGEST ISSUE EVER

SPECTRUM JOINS THE GOOD BUDDIES

—User of the Month

COMPETITION-PRO Joystick

PRECISION GAME CONTROL!

SPECTRUM JOYSTICK NOW AVAILABLE FROM LARGER BRANCHES OF WHSMITH

Outstanding Features

- Self centreing stick
- Super strong nylon and steel construction
- A total of 8 directions *plus* 2 large fire buttons (for left or right handed operation)
- Arcade proven moulded leaf switches ensure incredible reliability
- Complete with boxed interface on Spectrum models
- A wide range of Joystick compatible software readily available from W H Smith and leading computer shops or direct from us

Access
BARCLAYCARD
VISA

I wish to order:	Item		Amount
Hardware			
☐ Spectrum Joystick		@ £25.00	
☐ VIC 20 Joystick		@ £16.50	
☐ Atari 400/800 Joystick		@ £16.50	
Software			
☐ Slippery Sid	16K Spectrum Silversoft	@ £5.95	
☐ Cyber Rats	16/48K Spectrum Silversoft	@ £5.95	
☐ Night Flite	16/48K Spectrum Hewson Cons.	@ £5.95	
☐ 3D Tunnel	16/48K Spectrum New Gen	@ £5.95	
☐ Gulpman	16K Spectrum Campbell Systems	@ £5.95	
☐ Time Gate	48K Spectrum Quicksilva	@ £6.95	
☐ Meteroids	16K Spectrum Softek	@ £4.95	
☐ Spooky Man	16K Spectrum Abbex	@ £4.95	
☐ Galaxians	16K Spectrum Artic	@ £5.95	
		Post & Package	
		Total (VAT inclusive)	

Please tick appropriate boxes
Please add £1.00 P&P on hardware
Software post FREE

Cheques/postal orders should be made payable to Kempston (Micro) Electronics Ltd
For Access/Barclaycard please give your card number and signature

Card No

Signature

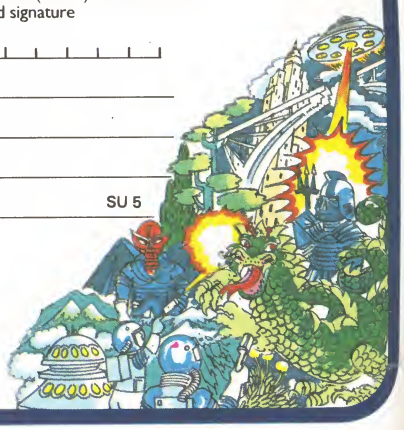
Address

SU 5

Please post to Kempston (Micro) Electronics, Dept
180a Bedford Road, Kempston, Bedford, MK42 8BL

SOLE UK DISTRIBUTOR

KEMPSTON MICRO ELECTRONICS



Contents

sinclair user

incorporating Spectrum User

Editor
Nigel Clark

Consultant editor
Mike Johnston

Production editor
Harold Mayes MBE

Staff writer
John Gilbert

Design
William Scolding

Editorial director
John Sterlicchi

Advertisement manager
John Ross

Sales executive
Annette Burrows

Editorial/production assistant
Margaret Hawkins

Managing director
Terry Cartwright

Chairman
Richard Hease

Sinclair User is published monthly by ECC Publications Ltd.

Telephone
All departments
01-359 7481

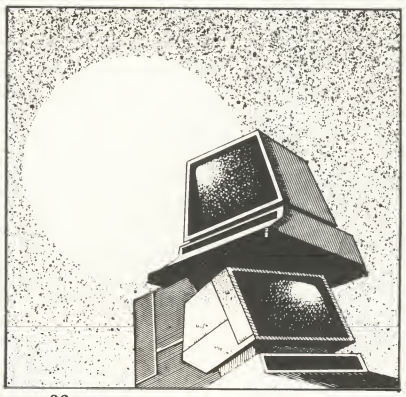
If you would like to contribute to any of the Sinclair User group of publications please send programs, articles or ideas for hardware projects to:
Sinclair User and Programs,
ECC Publications,
30-31 Islington Green,
London N1 8BJ

Programs should be on cassette and articles should be typed. We cannot undertake to return them unless a stamped-addressed envelope is included.
We pay £10 for the copyright of each program published and £50 per 1,000 words for each article used.

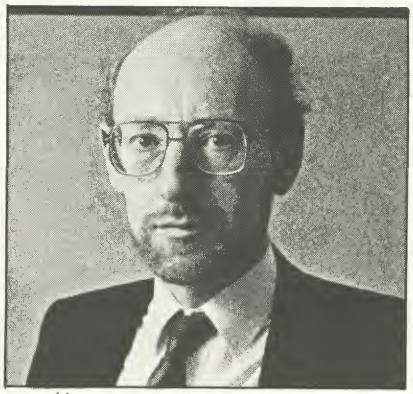
© Copyright 1983
Sinclair User
ISSN No 0262-5458

Printed and typeset by
Cradley Print PLC,
Warley,
West Midlands

Distributed by
Spotlight Magazine Distribution Ltd,
1 Benwell Road,
Holloway,
London N7
01-607 6411



page 36



page 44

5 SINCLAIRVOYANCE We examine the Sinclair Research record on making premature announcements.

9 SINCLAIR USER CLUB The offers include the amazing digital tracer from RD Laboratories to help our members benefit from the club.

13 NEWS The launch of the Microdrive is still uncertain; Clive Sinclair becomes Young Businessman of the Year; upgraded ZX-81 is planned for the United States.

17 LETTERS More of your comments about the market for Sinclair computers.

23 HARDWARE WORLD Stephen Adams assesses the latest add-ons, including a Spectrum printer interface and a keyboard.

27 SOFTWARE SCENE More new tapes are becoming available for the ZX-81 which we include in a special section.

36 LANGUAGES John Gilbert looks at alternative ways of speaking with your machines.

44 SINCLAIR SPEECH At a recent dinner at the London Business School, Clive Sinclair gave his views of the state of British industry. We publish a report.

47 GRAPHICS One of the limitations of the ZX-81 has been the graphics. Stephen Adams reviews the graphics ROM from dK'tronics.

53 PROGRAM PRINTOUT This month we have 14 pages of interesting programs for you to enter.

72 USER OF THE MONTH Our second interview with interesting users features someone who discovered how to send programs over the CB airwaves.

75 INSIDE SINCLAIR A picture feature on the specially-designed offices into which Sinclair Research has moved recently in Cambridge.

79 ORIC We assess one of the likely rivals for the Spectrum in the coming year.

83 PROGRAMMING John Gilbert completes his series on how to program with error-trapping techniques and a look back at the previous instalments.

89 BOOKS Machine code dominates the publishers' lists this month.

93 STARTING FROM SCRATCH Our regular feature to help you make a good start with your machine.

94 SINCLAIR SIMON Simon visits the new offices of Sinclair Research.

101 HELPLINE This important section from our expert Andrew Hewson has been expanded to three pages.

107 MIND GAMES Quentin Heath returns to Middle Earth following the reaction to his first article on The Hobbit.

NEXT MONTH
Stephen Adams reviews the Basicare modules for the ZX-81 and we assess the growing numbers of information filing systems.

"IT LOOKS NICE BUT WHAT THE HELL CAN I DO WITH IT?"

Every ZX SPECTRUM Print'n'Plotter Jotter has 100 pages of finely printed screen grids.

50 for the high resolution screen. 50 for the normal character screen.

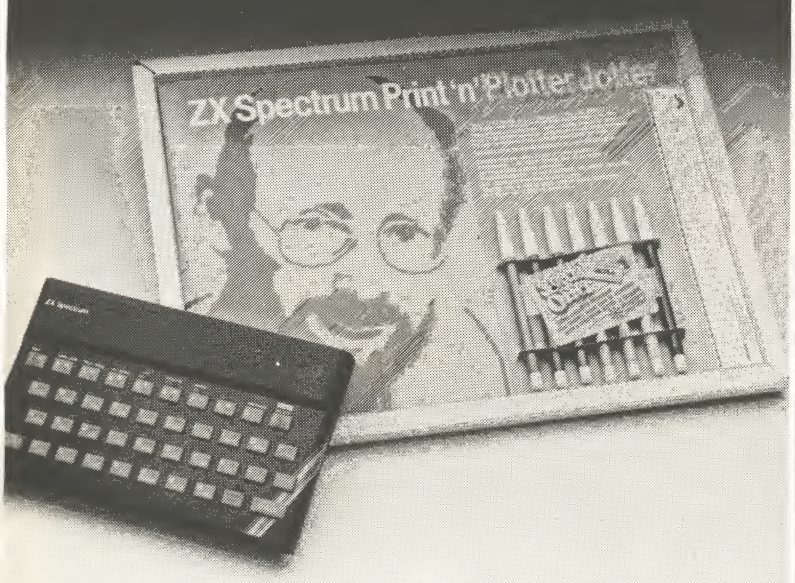
With these at your disposal you can plan practically any graphics print-out to program into your computer.

The high-resolution PLOT grid shows every one of the 45,060 pixels! Every one printed. Every one with its co-ordinate numbers. This gives you enormous graphics power to DRAW, PLOT, CIRCLE, PLOT OVER and so on in any position or screen building up graphic drawings, charts, maps . . . in fact anything without the complications of guesswork, integer out of range, or wrongly positioned pixel colours which change PRINTed INK characters!

The normal character PRINT grids on the other hand will allow you to be specific about PRINT AT, TAB, PRINT OVER, SCREEN$ and INK/PAPER in direct co-ordination with PLOT . . . you see every page is printed on **high quality tracing paper** . . . ideal to overlay on to illustrations and 'copy' or co-ordinate.

And there's another bonus, because each page contains 24 User-definable grids — **2400 per pad!**

With 50 pages of PLOT grids, 50 pages at PRINT grids 2400 user-definable grids, a set of colour pens, a printed PIXEL RULER and our Special Offer of demo programs, IT'S THE BEST VALUE IN ZX GRAPHICS PROGRAMMING.



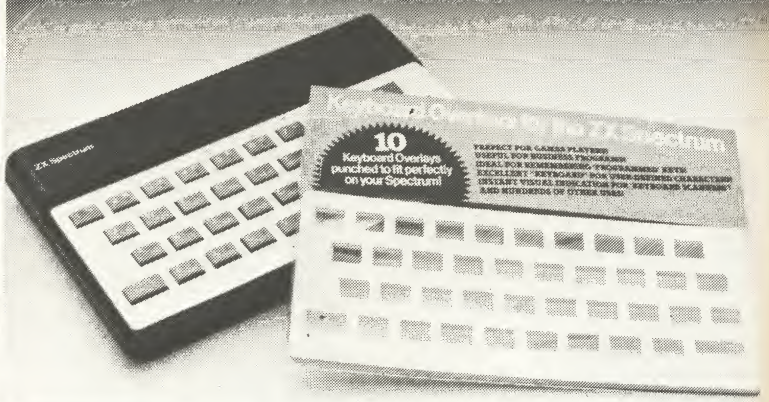
"NOW WHICH KEY DO I PRESS TO SHOOT DOWN THE THING FROM MARS?"

Ever forgotten which key to press when playing a game?
Do you suffer from a mind-boggling mass of programmed keys?
Do you write programs that use different keys to perform various functions? If so, we have just the thing for your ZX SPECTRUM.

A pack of Print'n'Plotter Keyboard Overlays.

Just write the function or functions under each key you program and keep the overlay for the next time you play the game.
Of course there's lots of more uses you will find for our OVERLAYS, user defined characters, keyboard scanners, mathematical programs, business uses — to name just a few.

There's TEN OVERLAYS to a pack — so you can program with impunity! And they fit perfectly onto your standard ZX SPECTRUM KEYBOARD. Each OVERLAY is printed with the cursor movement key directions and there's room for program name etc.



"ZX81 GRAPHICS BETTER THAN SQUIGGLES AND BLOBS?"

Disappointed with ZX81 Graphics? Perhaps you haven't explored the vast possibilities.

Why not invest in a ZX81 JOTTER, FILM and our guide "ZX81 Graphics programming made easy"?

The JOTTER is a 100 page pad of PRINT grids and PLOT grids with all numbered co-ordinates. The FILM is a re-usable matt transparent polyester version of the grids which can be drawn-on and used again . . . ideal for overlaying and copying.

The 24 page full colour guide will show you how to use the JOTTER and FILM to produce perfect low resolution graphics on your ZX81!

So stop squiggling. Get a set now!

"PRINTER PAPER THAT WORKS? I DON'T BELIEVE IT!"

Five rolls of our PRINTER PAPER will only cost you £10.95. And you will gain a great deal more! It prints beautifully. It's not too thick. It's not too shiny. Print is black — not grey. It actually feeds through the machine! See for yourself. Only £10.95 for 5 rolls. Beware of expensive imitations!

"WHERE CAN I GET THEM?"

Post now or call at one of our retailers!
Post to Print 'n' Plotter Products, 19 Borough High St., London SE1 9SE.

Name:.....

Address:.....

.....

..... SA

..... ZX SPECTRUM JOTTER @ £9.95 each.
..... ZX SPECTRUM KEYBOARD OVERLAYS @ £2.95 per pack
..... ZX SPECTRUM DEMO CASSETTE @ 95p each.
..... ZX81 JOTTER PADS @ £3.50 each.
..... ZX81 FILMS @ £2.25 each.
..... ZX81 "GRAPHICS PROGRAMMING GUIDE" @ £1.50 each.
..... ZX PRINTER PAPER @ £10.95 per five rolls.

Remittance enclosed. Please bill my Access/Barclaycard/Visa/Mastercard No:

.....

Please note: Price quoted include VAT, P&P for UK deliveries.
Overseas order please add 25% for additional Surface Mail.

You can see and buy most of our products at:
W. H. Smith (Computer Stores)
Buffer Micro (Streatham 01-769 2887)
Microware (Leicester 0533 29023)
Dennys Bookshops (London EC1 01-253 5421)
Personal Computer Services (Darwen Lancs 0254 776677)
Telford Electronics & Computing (Shifnall 0952 460008)
Georges Bookshop (Bristol 0272 276602)
Microtech Systems (Gillingham Kent 0634 571321)
Northampton Home Computer Centre (0604 47749)
Philip Copley Hi Fi (Ossett W. Yorks 0924 272545)
Darlington Computer Shop (Darlington 0325 487478)
Lancashire Micros (Morecambe Lancs 0524 411435)
North East Computers (Peterhead 0779 79900)
Photo-Video (Hereford 0432 267997)
Computers for All (Romford 0708 752862)

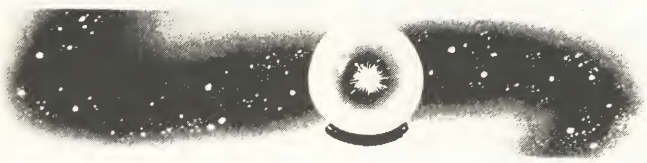
Print 'n' plotter Products

Microdriving lessons taken

IT SEEMS that the much-heralded Microdrive is about to make an appearance. At the same time the first signs of a long-awaited conscience are being seen in the workings of Sinclair Research. Neither has come a moment too soon.

One wonders at what stage of development the drive was when it was announced at the launch of the Spectrum in April last year. Was it only a gleam in Clive's eye with an empty box just for show? We were assured that the box contained something but surely after all this time any such contents cannot have much resemblance to the final device.

Vapourware has been the term coined to describe items which are announced but take a long time to materialise. For



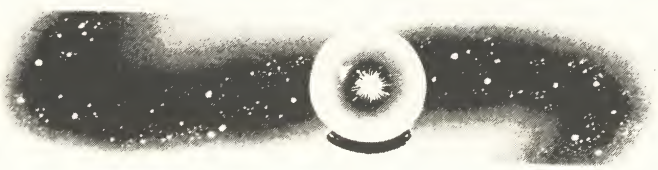
reasons expressed previously vapourware does not serve the consumer very well because of the disruptive effect it has on buying decisions.

Many people have been prompted to buy the Spectrum because of the expected arrival of the extra 100K of memory provided by the Microdrive. How many would have made that decision if they had known the delays they could expect?

This particular piece of vapourware cannot have served the researchers at Sinclair very well either. To announce a product with fairly tight specifications for price and size places a restriction on much of the possible movement in finding solutions to possible problems. That must have aggravated delays once any problems arose.

If that was an isolated incident in a generally satisfactory record for Sinclair Research, it would not perhaps matter too much. After all, if the drive were to appear sometime in April or May, it will be only four months after the first projected deadline. It is not isolated, though.

Include with this the announcement of the upgrade facility. This magazine and many other people were under the impression that the service had been available from the launch. Also



include the move into telesoftware. The plans to produce an adaptor and provide software via the Prestel service, announced last autumn, have now fallen into abeyance. The intention is still to move into that market at some time but no firm date has been fixed.

It is just as well that Micronet 800 does not suffer from the same problems, or Sinclair users might never have been able to take advantage of the benefits of linking-up through the Prestel system.

Add the problems with the Spectrum delays last year and you have a company which not only is working at the limits of technology but also at the limits of credibility. Users may be willing to accept a great deal in the cause of home computing but even they are upset when they are disappointed repeatedly.

As more and more people acquire the Sinclair habit, fewer and fewer will be willing to tolerate the problems suffered by the pioneers.

Thankfully it seems that the message is being understood at Sinclair. In the words of managing director Nigel Searle: "We have learned from our experience." Questioners on future products will now be given few details and no estimate of dates.

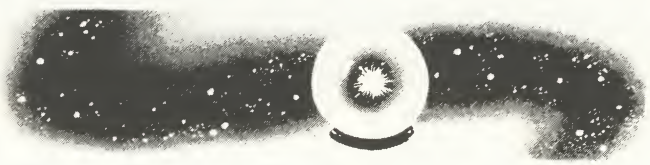
That may be bad news for we who thrive on information about new products and predicted and missed launch dates but consumers will know better where they stand.

In future it should be as difficult to receive an early warning of new products as it has been to learn about the workings of the Microdrive.

No doubt there will be the usual rumours, informed guesswork and unofficial leaks to help maintain interest in what can be expected from Sinclair Research. The company, however, is determined to remain quiet until it feels that it has something worthwhile to say.

That determination extends to the United States and developments by Timex. According to Sinclair it knows nothing of the TS1500 although the plans for its production appear to be at an advanced stage. It could be that Sinclair is thinking of putting it on the British market before the end of the year.

The company is backing its new-found concern by conducting a series of exercises designed to recompense further the early sufferers of the Spectrum delivery problems. They are to



be given the opportunity to be the first to take advantage of the upgrade to 48K and the Microdrives when they appear. Free cassettes and special offers are also being made.

That means that anyone who had to suffer Spectrum delivery delays will have been given preferential consideration on a number of products, the chance of free cassettes and special offers on the printer and printer paper. That might cheer many people but most of them would have preferred the machine on time and in working order.

Which introduces another point. It is to be hoped that after all the ballyhoo, missed launch dates and a Road-to-Damascas conversion, the Microdrives work when they arrive. It would be the last straw for many customers if the drives, in whatever form they take, fail to produce what has been expected of them.

To finish on a light note, it is to be hoped that the people working on the drives in Cambridge have what they expect from the new facilities in Willis Road. The conditions during a Press visit to the stainless steel palace did not augur well.

While Nigel Searle was being questioned about the Microdrives and other associated matters, the room temperature rose gradually. Despite the latest chip technology, which was supposed to control the environment, the atmosphere deteriorated rapidly with some well-lunched journalists beginning to have difficulty keeping their eyes open.

An old-fashioned remedy was tried — the window was opened. Back to the drawing-board.

You'll find a complete spectrum of software at W.H.Smith.

Flight Simulation
Sinclair
48K £7.95

Penetrator
Melbourne House
48K £6.95

The range of software available for the Sinclair Spectrum is to say the least, extensive.

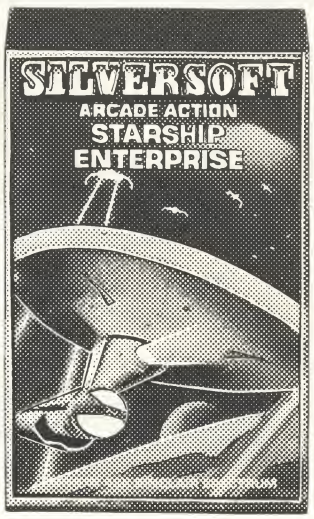
So every month at W. H. Smith, we review the range with particular reference to presentation, challenge, excitement and value for money. And because we're quite severe it's a difficult job finally to arrive at a Top Ten. But as you can see, not impossible.

You don't have to take our word for it.

At W. H. Smith we stock the widest selection of Spectrum Software, so you can judge for yourself.

Title	Producer	K RAM	Price
Arcade Games			
Meteor Storm	Quicksilva	16	£4.95
Space Intruders	Quicksilva	16	£4.95
Time Gate	Quicksilva	48	£6.95
Gulpman	Campbell	16	£4.95
Spectral Invaders	Bug-Byte	16	£5.00
Meteoroids	Softek	16	£4.95
Planetoids	Sinclair	16	£4.95
Hungry Horace	Sinclair	16	£5.95
Space Raiders	Sinclair	16	£4.95
Mazeman	Abersoft	16	£4.95
Nightflight	Hewson	48	£5.95
Ground Force Zero	Titan	16	£5.00
Caterpillar	CDS	16	£5.95
Leapfrog	CDS	16	£5.95
Gobble-A-Ghost	CDS	16	£5.95
Centi-Bug	DK Tronics	16	£4.95
Cruising	Sunshine	16	£4.95
Blind Alley	Sunshine	16	£4.95
Derby Day	Computer Rentals	48	£5.95
Jackpot	Computer Rentals	48	£4.95
Escape	New Generation	16	£4.95
Gobbleman	Artic	16	£4.95
Galaxians	Artic	16	£4.95
Invasion Force	Artic	16	£4.95
Sentinal	Abacus	16	£4.95
Cyber Rats	Silversoft	16	£5.95

Chess
Sinclair
48K **£7.95**



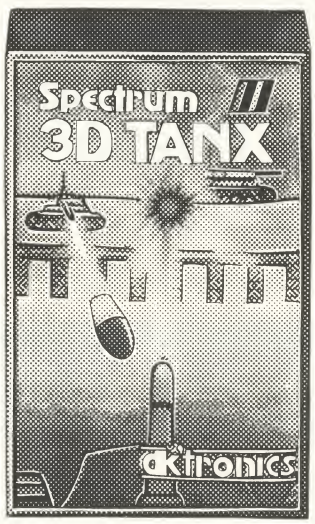
Starship Enterprise
Silversoft
48K **£5.95**

Horace Goes Skiing
Sinclair
16K **£5.95**

Avenger
Abacus
16K **£4.95**

3D Tunnel
New Generation
16K **£5.95**

Mined-Out
Quicksilva
48K **£4.95**



3D Tanx
DK Tronics
16K **£4.95**

Arcadia
Imagine
16K **£5.50**

Title	Producer	K RAM	Price
Ground Attack	Silversoft	16	£5.95
Orbiter	Silversoft	16	£5.95
Slippery Sid	Silversoft	16	£5.95
Strategy Games			
Battle of Britain	Microgame	48	£5.95
Novotnik Puzzle	Phipps	16	£4.95
Chess	Artic	48	£9.45
Voice Chess	Artic	48	£9.95
Superchess II	C P Software	48	£7.95
Football Manager	Addictive	48	£6.95
Chess-The Turk	Oxford	48	£8.95
Dictator	DK Tronics	48	£4.95
Adventure			
Labyrinth	Axis	16	£5.95
Planet of Death	Sinclair	16	£6.95
Inca Curse	Sinclair	48	£6.95
The Hobbit	Sinclair	48	£14.95

Title	Producer	K RAM	Price
Ship of Doom	Artic	48	£6.95
Espionage Island	Artic	48	£6.95
Rescue	Computer Rentals	48	£5.95
The Orb	Computer Rentals	48	£5.95
Transylvanian Tower	Shepherd	48	£6.50
Utility			
M/C Code Test Tool	Oxford	16	£9.95
Editor/Assembler	Oxford	16	£9.95
Compiler	Softek	16	£14.95
Soft Talk II	C P Software	48	£6.95
Family Games			
Reversi	Sinclair	16	£7.95
Othello	CDS	16	£5.95
Golf	R and R	16	£3.75
Conflict	Martech	48	£11.95
Test Match	Computer Rentals	48	£5.95
Backgammon	C P Software	48	£5.95

Title	Producer	K RAM	Price
Draughts	C P Software	48	£6.95
Practical			
Vu-Calc	Sinclair	16	£8.95
Vu-File	Sinclair	16	£8.95
Vu-3D	Sinclair	48	£9.95
Collectors Pack	Sinclair	48	£9.95
Club Record Controller	Sinclair	48	£9.95
Address Manager	Oxford	16	£8.95
Finance Manager	Oxford	16	£8.95
Dietron	Custom Data	16	£4.75
Program Collections			
Shiva Special 1	Shiva	16	£5.95
Over The Spectrum 1	Melbourne House	16	£5.95
Over The Spectrum 2	Melbourne House	16	£5.95
Over The Spectrum 3	Melbourne House	16	£5.95

WHSMITH

Prices correct at time of going to press. Subject to availability. At selected branches only.

A MUST FOR ANYONE INTERESTED IN ZX MACHINE CODE!

The finest range of utility programs for ZX Computers. Used by professionals. Very useful for beginners

ZX SPECTRUM MACHINE CODE SYSTEM (The key to machine code success)

SPECTRUM EDITOR/ASSEMBLER A powerful and essential machine code programming aid.
16K and 48K on same cassette + full documentation.
Major features: EDITOR with Auto line number and renumber; 40 column screen display, tabulated into fields for easy reading; 5 character label names, easy line editing and cursor control; SAVE/LOAD/VERIFY routines, output to ZX PRINTER. TWO PASS ASSEMBLER accepts all Z80 mnemonics; decimal or hex numbers, simple arithmetic on operands; Assembler Directives — ORG, END, DEFB, DEFW, DEFS, DEFL, EQU, DEFM. **ONLY £8.50**

SPECTRUM MONITOR Machine Code Debug/Disassembler
Enter, Run, Debug M/C programs. Compatible with BASIC. Breakpoints and Registers Display. Disassembler to screen or ZX PRINTER. 16K and 48K on one cassette + 30 page manual. **ONLY £7.50**

ZX81 UTILITIES (For everyone . . . beginner to professional)

ZX81 REMLOAD Machine Code Debug/Monitor
Explore and master machine code. Compatible with BASIC. CREATE A REM line — any length. BREAKPOINTS & REGISTERS DISPLAY. Fully documented 30 page manual and cassette **ONLY £6.95** 16K to 64K

ZX81 ZX-MC Machine Code Debug/Monitor
The professional one! ENTER/RUN/DEBUG M/C programs. SAVE/LOAD/VERIFY at double speed. BREAKPOINTS & REGISTERS DISPLAY. Self-contained machine code — cannot be used with BASIC. 36 page manual and cassette. **ONLY £7.50** 4K to 64K

ZX81 SCREEN KIT 1 More screen power in your BASIC programs!
BORDERS — any size anywhere on screen. SCROLL in 4 directions. CLEAR and REVERSE part of the screen. FLASHING CURSOR anywhere on screen — simulates INPUT. DATA FILES SAVE/LOAD BASIC variables — Double speed. 880 Bytes machine code for instant response. Becomes part of your BASIC program. **ONLY £5.70** 4K to 64K

SEND CHEQUE/P.O. FOR FAST MAIL ORDER!
S.A.E. for full details.
6 Corkscrew Hill, West Wickham, Kent BR4 9BB
* All prices include VAT & P&P.

PICTURESQUE

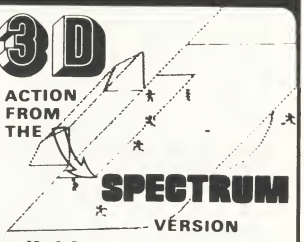
Spectrum Software available from: Buffer Micro Streatham, Microware Leicester. Educational suppliers: Griffin & George.

NOW IN YOUR HIGH STREET SHOPS

FOOTBALL MANAGER 3D

by Addictive Games

for **SPECTRUM 48K AND ZX81 16K**



This superb game is **now available** from branches of **W. H. SMITH** and **BOOTS THE CHEMIST.**

Manage your own team in this exciting game of skill which vividly captures the drama and excitement of real football.

FEATURES INCLUDE:
★ 4 DIVISIONS ★ F.A. CUP ★ PROMOTION & RELEGATION ★
★ TRANSFER MARKET ★ TEAM SELECTION ★
★ SAVE GAME FACILITY ★★★ *AND MUCH MORE!* ★★★

WHAT THE PRESS SAY ABOUT IT:—

IF YOU have always wanted to manage a football team, **FOOTBALL MANAGER,** *from Addictive Games, is for you — The game is ideal for a football fanatic but the most interesting thing for us was the 3-D graphics used to create the goalmouth action — the game is a winner.*
SINCLAIR USER FEBRUARY 1983

Although I'm no great football fan, I really enjoyed playing this game — excellent use is made of colour and user-defined graphics. The game is very logically put together, so that the development of strategy and tactics has a real effect. For example, one of my teams got through to the fourth round of the F.A. Cup where it was beaten by a second division side. This upset morale and meant that our promotion bid failed. Perhaps I should have given up the F.A. Cup run and held some good players back — the possibilities are endless. Brian Clough had better watch out!
ZX COMPUTING FEB/MARCH 1983

ALSO AVAILABLE FROM THE FOLLOWING SHOPS
BUFFER MICRO SHOP (London),
MICROWARE (Leicester),
ANIROG COMPUTERS (Horley, Surrey),
SUCCESS SERVICES (Walsall),
THE COMPUTER SHOP (Newcastle),
DRAGON BYTE (Leeds)
AND OTHER GOOD COMPUTER SHOPS

PRICES
FOR THE SPECTRUM 48K £6.95, ZX81 16K £5.95
3D GRAPHICS ONLY IN SPECTRUM VERSION
To Order send Cheque/P.O. payable to:
ADDICTIVE GAMES, Dept SU, P.O. Box 278,
Conniburrow, Milton Keynes MK14 7NE
PLEASE STATE COMPUTER

THE SPECTRUM POCKET BOOK

160pp £6.50

Trevor Toms, best selling author of the ZX81 Pocket Book and the Sinclair Learning Lab, turns his attention to the ZX Spectrum — the book you have been waiting for! All the material in the book is totally new.

Programs

- Castle walls; boiling oil and lovely slurping noises
- Great Fire of London; try and change the course of history
- Chase; outwit the pursuing robots and lead them to their doom
- Truly amazing; generate a new maze puzzle every go
- Reversi; the classic oriental strategy game with board screen display
- 3D Maze; race against time and three dimensions to escape.

Hints & Tips

Discover new ways of using PRINT; INSTR functions, VAL, PRINT USING, hexadecimal conversion, upper case conversion, load and save arrays. BEEP with sliding tones, automatic scroll and how to use all the machine features within machine code.

Machine Code

All the tools you need to write machine code effectively. Graphics tool kit — debug monitor — symbol assembler (with labels, all ED commands, ORG statements, forward and relative jumps) — disassembler (with label assignment); now you can really dig into the Sinclair ROM! This section alone would be stupendous value for money!

Spectrum Cassettes

Knight's Quest (48K)	£5.95
Nowotnik Puzzle (16K)	£4.95
Spectrum Pocket Book	£5.95

Cassettes for ZX81

Knight' Quest (16K)	£4.95
Nowotnik Puzzle, Demolition & Tenpin	£5.00
3 Adventures: Greedy Gulch, Magic Mountain, Pharaohs Tomb	£5.00
ZX81 Pocket Book Cassette	£5.00

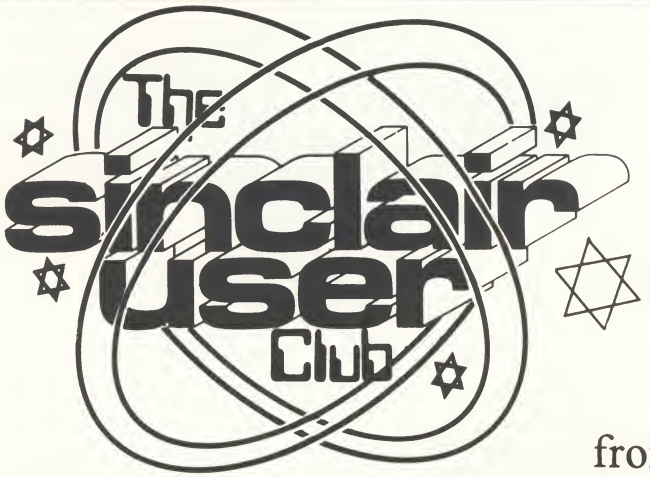
Prices include VAT

PHIPPS ASSOCIATES

Dept B FREEPOST EM463 (No stamp required)
99, East St, Epsom, Surrey KT17 1BR.
Telephone 03727-21215. 24hr phone service.

Prices include postage but for air mail delivery in Europe add 90p (outside Europe add £2.20) per item.

Access and Barclaycard accepted



We link top-class hardware with value-for-money cassettes to help members to get the most from their machines

Discount on 'outstanding' Digital Tracer from RD

WE DESCRIBED the RD Laboratories Digital Tracer as "one of the most outstanding achievements in the graphics field" in the March issue of *Sinclair User*. Now User Club members can take advantage of the discount price at which we offer this superb piece of equipment.

It is possible for the user to create spectacular screen displays using the device. Diagrams, maps and even photographs can be outlined using the arm of the tracer. The results are transferred to the screen using an analogue-to-digital converter and some software in the Spectrum.

Three-dimensional effects can also be created and user-defined graphics and text can be incorporated into the design. The device will turn the user into an instant computer artist.

Those digital masterpieces can be SAVEd on to cassette and recalled using the software provided by RD Laboratories.

The normal retail price of this innovation in technology is £49.95 but we offer it for £45. The offer, of course, is open only to club members.

Pimania, from Automata, is a game about which all Sinclair owners must know by now. This is your chance to buy the game which could win you the Golden Sundial of Pi. That was the first piece of good news. The second is that we can offer this massive adventure at a greatly reduced price.

The Spectrum version is available through the normal mail order outlet for £10 but we are offering it at £8. The 16K ZX-81 version is normally £5 but our reduction makes it £4.

The Bobker range of cassettes includes a mammoth seven games on one tape, a spy protection tape and a data file for serious use. Again there are substantial savings to be made on these tapes. **Adventure** is reduced by £1 and **List File** by £2.

New members can take advantage of these offers before their memberships are processed by including orders with membership forms.

RD Laboratories, 5 Kennedy Road, Dane End, Ware, Herts. SG12 0LU.
Automata, 65a Osbourne Road, Portsmouth, PO5 3LR.
G A Bobker, 29 Chadderton Drive, Unsworthy, Bury, Lancs.

	List price	Offer price
RD Laboratories		
Digital Tracer	**£49.95**	**£45**
Automata		
Pimania (48K Spectrum)	**£10**	**£8**
Pimania (16K ZX-81)	**£5**	**£4**
G A Bobker		
Adventure (7 in 1) (Spectrum)	**£6**	**£5**
Spy cassette (Spectrum)		**£2**
List File (Spectrum)	**£10**	**£8**

Cassette is popular

THE USER CLUB bi-monthly cassette has proved to be extremely successful. The club attempts to present as wide a range of programs as possible. So far, it has included games, utilities and educational programs. In addition, there is a series on Understanding machine code, backed-up by the telephone help line. Usually, three of those categories are covered in each issue.

Members are invited to submit their software and the club pays for the use of any which is suitable. Some very interesting educational programs have been submitted by Jeff Webb, a primary school teacher who is very interested in educational use of the Spectrum. Because of his profession it is its use in the classroom rather than the home which holds his main interest.

He feels there are three areas of application for the computer in the classroom. The first is in teaching the awareness of the computer, its uses, abilities and limitations. The second area is in

continued on page 10

MEMBERSHIP FORM

I wish to join the Sinclair User Club and enclose my subscription of £12

Name .....
Address .....
.....
.....
.....

Which computer do you own?
ZX-81 ☐ Spectrum ☐

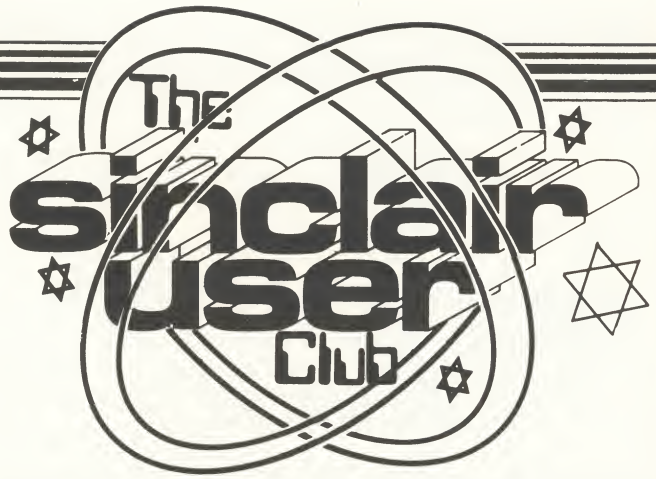
Send your coupons to Sinclair User Club, ECC Publications, 30-31 Islington Green, London N1 8BJ. Cheques should be made payable to Sinclair User Club.

continued from page 9

using the computer interactively, with the children experimenting within a model or simulation. The computer should become part of everyday equipment in the classroom, like a weighing machine or a tape measure.

Last, it can be used to assist the teacher in any area of the curriculum where other materials have failed or need reinforcement.

The programs Webb submitted illustrate those views. We also believe that educational programs should be interesting and well-presented and his certainly qualify for that category, as we are sure all club members will agree, and we hope he continues to produce them.



Britain

Aylesbury ZX Computer Club: Ken Knight, 22 Mount Street, Aylesbury (5181 or 630867). Meetings: first Wednesday and third Thursday of the month.

Bristol Yate and Sodbury Computer Club: 99 Woodchester Yate, Bristol, BS17 4TX.

Colchester Sinclair User Group: Richard Lown, 102 Prettygate Road, Colchester CO3 4EE.

Doncaster and District Micro Club: John Woods, 60 Dundas Road, Wheatley, Doncaster DN2 4DR; (0302) 29357. Meetings held on second and fourth Wednesday of each month.

Eastwood Town Microcomputer Club: E N Ryan, 15 Queens Square, Eastwood, Nottingham NG16 3BJ.

Edinburgh ZX Users' Club: J Palmer (031 661 3183) or Ken Mitchell (031 334 8483). Meetings: second Wednesday of the month at Claremont Hotel.

EZUG-Educational ZX-80–81 Users' Group: Eric Deeson, Highgate School, Birmingham B12 9DS.

Furness Computer Club: R J C Wade, 67 Sands Road, Ulverston, Cumbria (Ulverton 55068). Meets every other week on Wednesday evenings.

Glasgow ZX-80–81 Users' Club: Ian Watt, 107 Greenwood Road, Clarkston, Glasgow G76 7LW (041 638 1241). Meetings: second and fourth Monday of each month.

Gravesend Computer Club: c/o The Extra Tuition Centre, 39 The Terrace, Gravesend, Kent DA12 2BA. Bi-monthly magazine and membership card.

Hassocks ZX Micro User Club, Sussex: Paul King (Hassocks 4530).

Inverclyde ZX-81 Users' Club: Robert Watt, 9 St. John's Road, Gourock, Renfrewshire PA19 1PL (Gourock 39967). Meetings: Every other week on Monday at Greenock Society of the Deaf, Kelly Street, Greenock.

Keighley Computer Club: Colin Price, Redholt, Ingrow, Keighley (603133).

Lambeth Computer Club: Robert Barker, 54 Brixton Road, London SW9 6BS.

Liverpool ZX-Computer Centre: Keith Archer, 17 Sweeting Street, Liverpool 2.

Merseyside Co-op ZX Users' Group: Keith Driscoll, 53 Melville Road, Bootle, Merseyside L20 6NE; 051-922 3163.

Micro Users' Group: 316 Kingston Road, Ewell, Epsom, Surrey KT19 0SY.

National ZX-80 and ZX-81 Users' Club: 44-46 Earls Court Road, London W8 6EJ.

Newcastle (Staffs) Computer Club: Meetings at Newcastle Youth and Adult Centre, Thursday, 7.30 to 10 pm. Further information from R G Martin (0782 62065).

North Hertfordshire Home Computer Club: R Crutchfield, 2 Durham Road, Stevenage; Meetings: first Friday of the month at the Settlement, Nevells Road, Letchworth.

Northern Ireland Sinclair Users' Club: P Gibson, 11 Fitzjames Park, Newtownards, Co Down BT23 4BU.

North London Hobby Computer Club: ZX users' group meets at North London Polytechnic, Holloway Road, London N7 each Monday, 6pm.

Nottingham Microcomputer Club: ZX-80–81 users' group, G E Basford, 9 Holme Close, The Pastures, Woodborough, Nottingham.

Orpington Computer Club: Roger Pyatt, 23 Arundel Drive, Orpington, Kent (Orpington 20281).

Perth and District Amateur Computer Society: Alastair MacPherson, 154 Oakbank Road, Perth PH1 1HA (29633). Meetings: third Tuesday of each month at Hunters Lodge Motel, Bankfoot.

Regis Amateur Microcomputer Society: R H Wallis, 22 Mallard Crescent, Pagham, Bognor Regis, West Sussex PO21 4UU.

Scunthorpe ZX Club: C P Hazleton, 26 Rilestone Place, Bottesford, Scunthorpe; (0724 63466).

Sheffield ZX Users' Club: A W Moore, 1 Ketton Avenue, Sheffield S8 8PA, Yorkshire. Annual subscription 10, monthly newsletter and cassette.

Sittingbourne: Anurag Vidyarth (0795 73149). Would be interested to hear from anyone who wants to start a club near the Medway towns.

Stratford-on-Avon ZX Users' Group: Chris Parry, 16 Sackville Close, Stratford-on-Avon, Warwickshire.

Swansea Computer Club: B J Candy, Jr Gorlau, Killay, Swansea (203811).

Swindon ZX Computer Club: Andrew Bartlett, 47 Grosvenor Road, Swindon, Wilts SN1 4LT; (0793) 3077. Monthly meetings and library.

Worle Computer Club: S W Rabone, 18 Castle Road, Worle, Weston-super-Mare BS22 9JW (Weston-super-Mare 513068). Meetings: Woodsprings Inn, Worle, on alternate Mondays.

ZX-Aid: Conrad Roe, 25 Cherry Tree Avenue, Walsall WS5 4LH. Please include sae. Meetings twice monthly.

ZX Guaranteed: G A Bobker, 29 Chadderton Drive, Unsworthy, Bury, Lancashire. Exchanges information and programs throughout the country.

ZX-80/ZX-81 Users' Club: PO Box 159, Kingston-on-Thames. A postal club.

Overseas

Belgium: ASBL BDMA Belgium National Sinclair Club; P Glenisson, Rue De l'Epeestraat, 14, 1200 Bruxelles.

Belgium, France and Luxembourg: Club Sinclair, Raymong Betz, 38 Chemin du Moulin 38, B-1328 Ohain, Belgium (322 6537468).

Denmark: Danmarks National ZX-8081 Klub (DNZK), Jens Larson, Skovmosevej 6.4200 Slagelese, post giro 1 46 24 66.

ZZ-Brugergruppen i Danmark, Boks 44, 2650 Hvidovre, Gratis medlemskab og gratis blad til enhver interesseret.

J Niels-Erik Hartmann, OZ-ZX-Radioamator, Bruger Gruppe, Bredgade 25 DK-4900, Nakskov.

East Netherlands: Jonathon Meyer, Van Spaen Straat 22,6524 H.N. Nijmegen; (080 223411).

Germany: ZX-80 Club, a postal club; contact Thomas Jencyzyk. Hameln, Postfach 65 D-3250 Hameln, Germany.

Indonesia: Jakarta ZX-80/81 Users' Club, J S Wijaya, PO Box 20, Jkukg, Jakarta, Utara, Indonesia.

Irish Amateur Computer Club: Martin Stapleton, 48 Seacourt, Clontarf, Dublin 3. (331304).

Italy: Sinclair Club, Vie Molimo Vecchio so/F, 40026 Imola, Italy.

Micro-Europe: Belgium or Club Paris-Micro, 19 Rue de Tilly, 92700, Colombes, France; associated with Club Micro-Europe.

Republic of Ireland: Irish ZX-8081 Users' Club, 73 Cnoc Crionain, Baile Atha, Cliath 1.

Singapore: Sinclair Users' Group: Eric Mortimer, 1D Wilmer Court, Leonie Hill Road, Singapore.

South Africa: Johannesburg ZX-80–81 Computer Users' Club: S Lucas, c/o Hoechst SA (Pty) Ltd, PO Box 8692, Johannesburg.

Johannesburg ZX Users' Club: Lennert E R Fisher, PO Box 61446, Marshallstown, Johannesburg.

Spain: Club Nacional de Usuarios del ZX-81, Joseph-Oriol Tomas, Avda. de Madrid, No 203 207, 10, 3a esc. A Barcelona-14 Espana. International ZX Spectrum Club: Gabriel Indalecio Cano, Sardana, 4 atrico 2a, San Andres de la Barca, Barcelona. Send international reply coupon. Produces a bi-monthly magazine. Spanish ZX Micro Club: Apartado 181, Alicante (Costa Blanca), Spain.

United States: Bay Area ZX-80 User Group, 2660 Las Aromas, Oakland CA94611.—Harvard Group, Bolton Road, Harvard MA 01451: (617 456 3967).

GET THE BEST NEW PROGRAMS AND THE ALL-TIME GREATS, SPECTRUM OR ZX81

AT SOFTWARE SUPERMARKET NOW

We started Software Supermarket with just one idea. To play all the Spectrum and ZX81 games we could find, to select the very best, and to offer only those to our customers.

Judging by our mail from all over the world, you're very pleased with our free selection service. It's impartial (we produce no programs ourselves) and it saves you £££'s on stamps and mistakes.

And it's fast. We usually despatch your order within 48 hours. Here's the best of the new and the best of them all for your Spectrum. Plus some great ZX81 games. Full detailed catalogue sent free with every order. Or send large SAE for catalogue only.

ZX SPECTRUM: 16/48K

Our latest Top 10 Programs for your Spectrum. They run on both 16 & 48K.

3D TUNNEL Brilliant NEW 3D graphic game by Malcolm "Escape" Evans. Fly down the winding 3D tunnel shooting bats, spiders, frogs and rats! Demo mode: 3 speeds: training program for each phase. And (48K only) watch out for the Tube train! (New Generation) £5.95

3D TANX NEW game with stunning graphics. Shoot the enemy from your 3D tank turret. 3 play levels: accurate ballistics: 1 or 2 players: hold feature: demo mode: training program. And choose your own control keys: even plays 'God Save The Queen'! (DK'Tronics) £4.95

WINGED AVENGER *"One of the best...covers all the stages of the arcade original...a game to come back to." Pop:Comp:Wkly.* Very fast 'PHOENIX'. 7 play levels: 3 attack waves: laser shield: mothership with smart bombs. (Work force) £4.50 (16K ZX81 version, £4.50)

GROUND ATTACK *"Best Spectrum version of the arcade game" Yr:Comp: "Very absorbing" E&C: "Extremely good" Pop:Comp:Wkly.* Thrilling SCRAMBLE'. Pilot your ship thro' 26 zones: up, down, brake, thrust: smart bombs: as you get better, it gets harder. (Silversoft) £5.95

CENTIPEDE The first - and fast - Spectrum version of the famous arcade game. Full arcade movement - left, right, up, down, fire - as you attack the centipede. Great graphics. Watch out for the jumping spider! 3 lives: hold feature. (DK'Tronics) £4.95

ESCAPE *"One of the best and most original games we have seen" S.User.* 5 very real dinosaurs chase you round the maze as you search for the axe to escape. Different maze every time. 5 play levels: 9 speeds: Hall of Fame. (New Generation) £4.95

GULPMAN *"The one cassette that I would buy...an exceptional program." Pop:Comp:Wkly* 15 mazes, each with demo mode: 9 speeds: laser gun helps against 4 chasers. Program your own control keys: personalise/save your very own game. (Campbell) £5.95

COSMOS NEW! Fantastic graphics. Loads in 2 parts (instruction manual first). Protect your 9 ships against 18 aliens, warp mines, asteroids. Your graphic on-board computer helps with elaborate displays. Our favourite new game. (Abbex) £5.95

FAUST'S FOLLY The first adventure we've seen that's worth playing in 16K. It's great and it's got graphics! Loads in two parts: clear instructions first. Then a smashing adventure with directions, inventory, look, score, save. Amazing! Abbex) £5.95

OTHELLO *"Recommended without reserve...a superb opponent" Yr:Comp.* The great 19th Century power game. Surround your opponent: capture his territory. Millions of different games: maximum 60 moves each. 1 or 2 players: demo game: 9 skill levels: print. (Mol) £7.95

ZX81 OWNERS!

Special 16K ZX81 versions of 6 of these programs are available:

WINGED AVENGER	**£4.50**	**PIMANIA**	**£8.00**
OTHELLO	**£6.95**	**CHESS 2**	**£9.95**
BLACK CRYSTAL	**£7.50**	**GREAT BRITAIN LTD**	**£4.95**

Use the coupon to order. Free detailed catalogue of our best ZX81 games with every order. Or send large SAE for catalogue only.

48K SPECTRUM ONLY

These programs use nearly all the Spectrum's 48K. They will not run on the 16K Spectrum. But there are versions of Black Crystal, GB Ltd, Pimania and SpecChess for for 16K ZX81.

PIMANIA *"The best adventure game we have reviewed" S.User. "An adventure enthusiast's dream" C&V Games.* Best use of Spectrum graphics and music we've seen. A wonderfully witty adventure - and you could win the £6,000 Golden Sundial of Pi. (Automata) £10. (ZX81 16K version: £8)

TIMEGATE *"The best graphical game I have seen on any micro" Interface. "Excellent graphics...one of the best" Yr:Comp: "Fast and furious...required playing for any Spectrum owner" Which Micro?* 5 skill levels: training program: Hold: Hall of Fame: keyboard overlay: 26-page on-screen manual: (Quicksilva) £6.95

THE HOBBIT *"Superior to any other adventure game available for the Spectrum" Yr:Comp:* Free 285-page illustrated book of The Hobbit contains clues to help solve the adventure. 30 beautiful full-screen pictures: 500 word vocabulary: 16 page instruction manual: save: print. pause. It took 4 people 18 months to write! (Melbourne House) £14.95

GREAT BRITAIN LTD *"A colourful and sophisticated management game" Pers:Comp:wld: "Difficult and challenging" ZX Comp:* Even plays 'Rule Britannia'! Choose your party and run the country. Will inflation and unemployment come down or the rioters come out? It's up to you. Then watch the results on election night! (Hessell) £5.95 (16K ZX81 version, £4.95)

SPECCHESS *"The standard for ZXChess" ZX Comp: "The strongest chess program" Pop:Comp:Wkly.* Full graphic chessmen: 7 play levels: all legal moves: position analysis for problem-solving: recommended move option: print game history. (Artic) £9.45 (ZX81 non-graphic 16K version £9.95)

BLACK CRYSTAL Take the adventure of your life. 180K of program to unravel, on two thrilling cassettes! You must solve each of the 6 stages to defeat the Lords of Chaos. Real-time monster battles: 16 command keys. (Carnell) £7.50 (16K ZX81 version: Over 100K loads in 7 parts. £7.50)

Post to: SOFTWARE SUPERMARKET, 87 Howard's Lane, London, SW15 6NU.

If you do not want to cut this magazine, write your order out carefully on plain paper and quote this number:**SU6** Mail Order Only.

I own a 16K Spectrum ☐ 48K Spectrum ☐ 16K ZX81 ☐ (please tick)

I enclose my Cheque/PO for £..... payable to Software Supermarket.
Please use block capitals. If we can't read it, you won't get it.

Name .....

Address .....

.....

.....Postcode .....

Phone, if any, in case we have any query .....

Program Name	Computer	Price
POSTAGE AND PACKING	U.K. Add 55p only per order	£
	EUROPE. Add 55p for each program	£
	OUTSIDE EUROPE. Add £1 for each - program airmail.	£
	TOTAL	£

SOFTWARE SUPERMARKET
87 Howard's Lane, London SW15 6NU. 01-789 8546

MICROWARE Leicester "THE FRIENDLY TO USER STORE"

SUPER SOFTWARE CLUB

MEMBERSHIP INCLUDES: **20% OFF FIRST TAPE**
15% OFF NEXT THREE TAPES.
10% OFF ALL FUTURE TAPES AS MEMBER

★ Special offers ★ Forthcoming free offers ★ Occasional special hardware offers ★ Regular Newsletter ★ Only the best software stocked

ZX81 · SPECTRUM · DRAGON 32 · ORIC 1 · JUPITER ACE · B.B.C.

TWO SCHEMES

★ MAIL ORDER MEMBERSHIP: **£8.00** ★ SHOP MEMBERSHIP: **£5.00**
★ OPTIONAL LIFE MEMBERSHIP **£5.00** EXTRA ★ SPECIAL SCHEMES FOR 15-YEARS-OLD AND UNDER ★ O.A.P.s ★ UNEMPLOYED. TELEPHONE ACCESS/ BARCLAYCARD/VISA ACCEPTED OR S.A.E. FOR FULL DETAILS.

FREE DRAW FOR JUPITER ACE COMPUTER ON APRIL 30th FOR ALL MEMBERS!

You know us! We are genuine! Full refund of fee if not satisfied when membership details arrive or anytime in first six months if genuine complaint is not resolved within 30 days.

"THE FRIENDLY TO USER" STORE
Pop-in to the shop and have a chat about the club if you wish — no obligation.

5 ST. PETERS LANE, LEICESTER. TEL: 0533 29023

THE "FRIENDLY TO USER STORE"

THE FIRST MIDLANDS REGION SHOP SPECIALISING IN **SINCLAIR COMPUTER** ACCESSORIES AND HOME COMPUTING GENERALLY.

STOCKING: SINCLAIR ZX81 and SPECTRUM, DRAGON 32, ORIC 1 and JUPITER ACE. FULL RANGE OF HARDWARE and SOFTWARE.

Possibly the widest range of software available in the Midlands. BBC software now available!

SPECIAL MICROWARE'S OWN SOFTWARE FOR THE ZX SPECTRUM.
ALIEN COMMAND 16/48K SPECTRUM **ONLY £4.75**
BACKGAMMON 16/48K SPECTRUM **ONLY £4.50**
YAHTZEE 16/48K SPECTRUM **ONLY £4.50**
Please include 50p post & packaging with software orders.

All programs purchased from us are sold on condition that they will not be subject to unauthorised copying, hiring, lending, exchanging or public broadcasting.

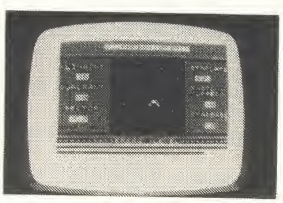
Sorry! We don't sell: stationery, cameras, hi-fi, TVs, cosmetics or pills, only home computers and accessories!

5 ST. PETERS LANE LEICESTER TEL: 0533 29023
Open 9.30-5.30 closed Monday
SEND S.A.E. FOR FURTHER DETAILS

MICROWARE Leicester "THE FRIENDLY TO USER STORE"

ALL NEW!

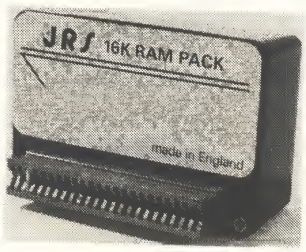
Just £4.95!



New slimmer, lighter RAM Pack for the ZX81—no wobble problems, and completely reliable—fully printer compatible.

New SPACE TREK

All the features of the favourite 'Star Trek' game plus graphic warp drive and arcade type klingon shoot-out make this program a must for the dedicated 'trekker'.



Only £26.50!

Buy the two together as a budget pack for only £29.95!

JRS SOFTWARE
19 WAYSIDE AVENUE, WORTHING, SUSSEX. BN13 3JU Telephone: (0903) 65691

Other JRS ~~FAST LOADING~~ 16K Programs for the ZX81

£4.95 GAMES II— 3 arcade-style machine code programs (City Bomb, 3-D Battle, Gridball).

£4.95 LOST ISLAND—An absorbing adventure program in which you are shipwrecked on a desert island.

£5.95 GRAPHICS TOOLKIT—22 machine-code routines that enable you to considerably improve the screen displays in your own programs. ('Good value for money' ZX Computing Sept/Oct Issue).

£4.95 BATTLESHIPS—The classic game of Battleships and Cruisers—You versus the ZX81.

TO JRS SOFTWARE LTD, 19 WAYSIDE AVENUE WORTHING, WEST SUSSEX BN13 3JU

Qty.	Item	Price	Total
	BUDGET PACK	£29.95	
	JRS 16K RAM Pack	£26.50	
	SPACETREK	£4.95	
	GAMES II	£4.95	
	LOST ISLAND	£4.95	
	BATTLESHIPS	£4.95	
	GRAPHICS TOOLKIT	£5.95	
☐ Please tick for free catalogue		Total £	

(Note all prices include VAT, p&p)

I enclose Cheque/Postal order/Money order* for £ _____ made payable to JRS SOFTWARE LTD

Mr/Mrs/Miss _____

Address _____

*Delete as applicable

SU5

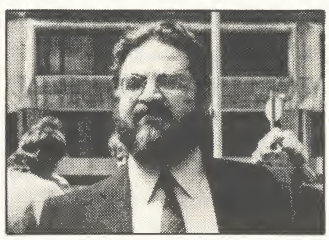
Trade group suggested

THE FORMATION of a trade association of software houses may not be far away. Many companies are beginning to see a need to pool resources and to standardise opinions on such issues as software libraries, piracy of software and trade links overseas.

The man behind the attempt to form the group is Robert Brenchley, of R and R Software. He says:

"At the moment there is a good deal of apathy in the industry. People are interested in forming a group but they do not have the time to do so."

Finding the companies willing to enter a group is not the only difficulty being experienced by Brenchley. "We are looking for a president who will chair meetings. That has proved the major sticking-point. It is best to have someone who is an independent and unconnected with any of the member companies."



MIKE JOHNSTON
Possible president

Several people have been suggested for the chairmanship. Mike Johnston, organiser of ZX Microfairs, is one who has been asked. Brenchley is also in contact with Dr Ian Logan, author of several books on Sinclair machines. He says:

"Logan is ideally suited for the job. He is well-respected in the software market and is an authority on Sinclair machines."

The association is still only an idea of Brenchley's but he hopes software manufacturers will contact him to discuss the subject.

Microdrives expected to be launched soon

SINCLAIR RESEARCH refuses to give a date when the long-awaited Microdrive is expected to be available. It is understood, however, that production was to begin before the end of April. Managing director Nigel Searle said:

"We have learned from experience not to give launch dates until we are sure. We cannot say when the Microdrive will be available."

He added that development was at a late stage with the custom-designed chips having been sent to a semiconductor manufacturer.

As a way of thanking people for their patience with the company in the last year, the first Microdrives will be available only to customers who ordered Spectrums before they were being sold retail last October.

NIGEL SEARLE
'Development at late stage'

"We are particularly concerned about all the people who were inconvenienced by having to wait so long. We think they should be given the opportunity to buy it first," Searle says.

The price of the drive is expected to be about £40, with another £30 for the interface which will allow up to eight drives to be attached to the Spectrum. The interface will also permit an RS232 printer to be added.

Searle says the drive will contain a removable "element" — as *Sinclair User* revealed, a floppy tape — which will be made available to software houses so that pre-programmed "elements" can be sold in the same way cassettes are sold at present.

Coursing

A NEW SERIES of courses for Spectrum owners who would like to learn more about their machines will be launched in August.

The courses are non-residential and will take place on the Wirral. There is room for 20 students and you do not have to own a Spectrum to join.

The courses cost £35 and each student will be provided with a machine. Further information from Mike Hare, 12 Prenton Farm Road, Birkenhead, Wirral.

Spectrums for export

THE SPECTRUM is entering the export market. By the end of April it was expected to be on sale in 30 countries.

Initial sales of 15,000 a month are anticipated, rising sharply throughout the year. Large advance orders have already been received from South America and the Far East but the company is concentrating first on European markets. Eventually it is hoped to open new markets in the Middle East and the rest of the third world.

Sinclair drops telesoftware

SINCLAIR RESEARCH has dropped plans for a Prestel/Micronet adaptor for the Spectrum. The company has split with Martochoice, which won a competition run by British Telecom last year to design a cheap Prestel interface for the ZX-81.

The company was co-operating with Sinclair Research, which was to manufacture the device.

Nigel Searle, managing director of Sinclair Research, says its plans for telesoftware are "now in abeyance". He says the company is still interested in the transmission of software over telephone lines but he could not say when it would renew its involvement.

Martochoice would not comment on its dealings with Sinclair Research regarding the adaptor.

Despite these problems Micronet 800 still plans to launch its Spectrum adaptor on May 1.

Upgrades offered

OWNERS of the 16K Spectrum can have their machines upgraded to 48K by Sinclair Research for £60. It involves returning the machine to Sinclair, which then upgrades the chips on the PCB.

It was announced that the facility would be possible when the Spectrum was launched a year ago but it has only just become available.

To ensure fair treatment, the company is making the service available in order of purchase and has already written to people who bought the machine early last year. No orders can be taken at present from more recent buyers.

People ordering the upgrade are being offered a free Sinclair 48K cassette of their choice and the chance to buy the ZX printer at a special price of £39.95 against the usual £59.95.

Plans for T/S1000 upgrade

TIMEX is planning to introduce a new Sinclair/Timex machine to the American market in the near future. It will be an upgraded version of the T/S1000, of which Americans have been critical since it was introduced last year.

The T/S1500 will be introduced on June 1. It will have a regular typewriter-style keyboard with movable keys and also an on-board 16K RAM.

Timex claims that the machine will have the simplicity of the T/S1000—ZX-81 lookalike—and will retail for approximately $100. Timex says that the new keyboard and 16K RAM are free addons.

Timex/Sinclair User for States

A NEW MAGAZINE for the owners of Timex/Sinclair machines in the U.S. has been launched by ECC Publications, the publishers of *Sinclair User.*

Timex/Sinclair User was launched in April and includes much the same mixture of reviews, projects and articles for which *Sinclair User* has become known.

Terry Cartwright, managing director of ECC, believes that there is a massive market for the magazines in the States. He says:

"There are three-quarters of a million Timex/Sinclair machines there at the moment and we expect it to grow to two million in the next year."

The print run on the first issue of the magazine is 100,000 copies, a large amount by any standards for a new magazine. Cartwright is confident of a massive response.

The first issue includes hardware reviews, book reviews, how to build your own EPROM blower and a four-part series on programming in Basic.

The American magazine has a separate editorial and advertising staff but members of the British *Sinclair User* team have been in the U.S. to co-ordinate the launch. They include John Sterlicchi, who acts as editor-in-chief, and John Ross, advertisement manager of *Sinclair User.*

Readers of the British *Sinclair User* may subscribe to the new magazine. Anyone wishing to do so should write to *Sinclair User.*

Sinclair gets young award

CLIVE SINCLAIR has been named Young Businessman of the Year by *The Guardian.* The award is made for the thirteenth time and goes to the person who has made the most significant contribution to business.

The award was presented at a Mansion House luncheon in March.

Handicapped microfair

A MICROFAIR with a difference is being held in September. It is called Electronic Aids for the Handicapped and is funded by the Department of Industry.

The exhibition will be mobile and will try to show what is being done in the field of microelectronics to help disabled people.

For further information, contact Ed Wilson at the Handicapped Persons Research Unit, Newcastle-upon-Tyne Polytechnic, No. 1 Coach Lane Campus, Newcastle-upon-Tyne NE7 7TW.

Pretorious Systems is almost bankrupt

SEVERAL months ago *Sinclair User* contained advertisements on behalf of Pretorious Systems, a manufacturer of ZX-81 RAM packs. Some readers have experienced problems with the firm, which is run by R U Ekam.

Ekam has stated that both he and his business are almost bankrupt and that he is no longer trading. *Sinclair User* has pursued the matter and has taken what steps it can to prevent Ekam from trading. The advertising department can now assure readers that no more advertisements for Pretorius Systems goods will appear in the magazine.

The magazine suggests that readers have no dealings with Pretorius Systems in future.

TOP TEN

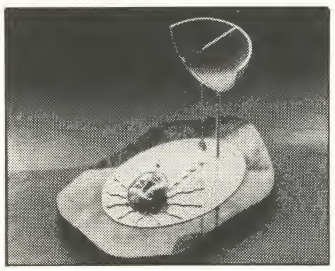
Program	Company	Machine
1 The Hobbit	Melbourne House	48K Spectrum
2 Black Crystal	Carnell	48K Spectrum
3 Time Gate	Quicksilva	48K Spectrum
4 Vu-3D	Psion	48K Spectrum
5 Flight Simulation	Psion	48K Spectrum
6 Penetrator	Melbourne House	48K Spectrum
7 Hungry Horace	Psion/Mel House	48K Spectrum
8 Avenger	Abacus	16K Spectrum
9 3D Tanx	d'Ktronics	16K Spectrum
10 Football Manager	Addictive Games	48K Spectrum

Compiled by W H Smith, Microware and Buffer Micro Shop.

Chasing Pimania

AUTOMATA is still looking for a winner of its adventure competition, Pimania. The prize is a golden sundial and to win it you must finish the game. Automata says that no-one has managed to do so and will not even reveal if anyone has been close to winning the prize.

Neither has a winner been found for the Krakit competition being run by Artic Computing in conjunction with International Publishing and Software. The prize is £10,000 if you can answer the questions posed on the Artic Krackit tape.



The Golden Sundial of PI

The PSS competition also closes this month. The company is looking for a good program written using a Spectrum or ZX-81 compiler. The winning program will be marketed by PSS.

THE NEW SPECTRUM

'ADD-ON'

NOW WITH ADDITIONAL SWITCH-TYPE JOYSTICK PORT

BLADAMM!

ONLY £22-50 PLUS VAT

COMPLETE your SPECTRUM with our Multi-purpose Sound Generator and Joystick-port Board!! With one low-cost purchase you can obtain the following outstanding improvements to your ZX SPECTRUM:

- THREE CHANNEL sound effects. PROGRAM three independent sounds with music, gun shots, explosions etc.
- AMPLIFICATION of the standard sound output.
- TWO ports for Potentiometer Joysticks;
- ONE port for Switch-type Joystick.

The 'ADD-ON' uses the amazing AY-3-8910 SOUND Chip, which gives you an enormous range of sound effects. The output and volume of each channel can be separately controlled, with gun shots, explosions, drums etc., produced under the 'sound envelope'. MOST IMPORTANT TO NOTE — the CHIP is 'processor independent.' This means that sounds can continue to be produced without any noticeable effect on the speed of your program!! The 'ADD-ON' contains its own speaker and amplifier chip and is supplied with a cassette containing sound demonstration routines and some sample sounds. The 'ADD-ON' simply plugs straight onto the back of your SPECTRUM. No soldering is required.

COMPLETE YOUR SPECTRUM NOW!!

JOYSTICKS (POTENTIOMETER-TYPE)
KIT (incl. case) **each £5.35 + VAT** BUILT **each £6.75 + VAT**

NEW **COWBOY SHOOT-OUT** (Machine Code) **£3.95 + VAT**
Full feature, TWO PLAYER, cowboy shooting game. Hide behind the cactus plants and moving chuck wagons until they are shot away. Shoot your opponent and avoid getting hit yourself. The second player can be the computer, but you set its skill from 10 levels. Excellent colour graphics and sound.

CABMAN (Machine Code) **£3.95 + VAT**
You are the owner of a fleet of yellow taxis. A rival firm competes with you, trying to steal your fares and run you off the road, if they can. Ten skill levels determine the number of opposing taxis the speed at which they drive and the amount you earn per completed journey. MAXIMISE your earnings before you lose your entire fleet. This program is FIRST CLASS.

MACHINE CODE PROGRAMMERS — ACS SOFTWARE
ASSEMBLER .....**NOW ONLY £5.95 + VAT**
DISASSEMBLER .....**NOW ONLY £4.95 + VAT**

BOOKS
LARGE RANGE FOR SPECTRUM AND ZX81

BBC, DRAGON & ACORN DEALERS

VISA

MICRO POWER

NOTE: We stock (and market) PROGRAM POWER SOFTWARE for the BBC, ACORN, SPECTRUM and DRAGON 32. Send S.A.E. for appropriate catalogue.

All programs are now available at all good dealers or direct from MICROPOWER LTD.

Dept. SU4
8/8a REGENT STREET,
CHAPEL ALLERTON,
LEEDS LS7 4PE.
Tel. (0532) 683186 or 696343

Please add 55p order P & P + VAT at 15%

WRITTEN ANY PROGRAMS? WE PAY 20% ROYALTIES FOR DRAGON, SPECTRUM BBC PROGRAMS

POWER MICRO PROGRAM POWER PROGRAM POWER MICRO PROGRAM POWER PROGRAM POWER MICRO PROGRAM POWER PROGRAM

ASTROLOGY

truly AVAILABLE AT YOUR FINGERTIPS

USER PROMPTING PROGRAMS: merely key in birth information as requested by the computer — READ OUT (and/or PRINT OUT) what is normally the result of many hours of painstakingly tedious and complex mathematical calculations using tables, ephemera, etc.

THE SIDEREAL TIME OF BIRTH.

THE ASCENDANT AND MIDHEAVEN in Sign, Degrees, Minutes, and Seconds for EQUAL HOUSE SYSTEM.

THE SIGNS AND POSITIONS OF THE HOUSE CUSPS in Sign, Degrees, and Minutes for the PLACIDEAN SYSTEM.

THE SUN AND MOON POSITIONS in Sign, Degrees. Minutes and Seconds.

ALL THE PLANETS POSITIONS in Sign, Degrees and Minutes. THE LUNAR NODE — THE PART OF FORTUNE — THE VERTEX, AND A HOST OF OTHER BIRTHCHART INFORMATION AT THE TOUCH OF A KEY.

ZX81 16K

ZOCIAC I ONLY **£10.00**
ZODIAC II ONLY **£8.00**

GIVES YOU THE ASPECTS AND MIDPOINTS

FOR 48K SPECTRUM AND DRAGON 32

ZODIAC F

Full combined program on one cassette

FOR ONLY **£15.00**

Other programs in course of preparation include: PROGRESSING THE HOROSCOPE; RECTIFICATION OF THE BIRTH TIME, etc.

Send orders with cheque payable to

STELLAR SERVICES

8 FIR TREE VALE, LEEDS LS17 7EY
Tel: (0532) 692770

---

campbell systems

THE VERY BEST IN MACHINE CODE FOR THE **ZXSPECTRUM** & **ZX81**

All programs supplied double-recorded and mailed 1st class by return. Prices include VAT and postage within Europe. SAE for full list.

for 48K Spectrum **MASTERFILE** business domestic filing and reporting system. So flexible that it is equally usable for your mailing lists, catalogues, stock control, text extracts ..... applications are endless. Fully user defined data and report display formats, dynamic variable length file, records and data items. Fully menu driven with powerful search facilities, sorting, total average, update, multiple independent files, printing. Yes, we aim to support microdrive when Uncle delivers. Nearly all the 8K we use is machine code, so you get 32K per file. Comes with example file and 22 page manual. £15.00

NEW Masterfile-16 for 16K Spectrum owners. We have produced a subset version of MASTERFILE called MASTERFILE-16. It has most of the features of big MASTERFILE, with 7 pre-defined report formats and 6 pre-defined fields e.g. name, address, etc., and we have found a useful 4500 bytes of file space. MASTERFILE and MASTERFILE-16 are fully 'file-compatible' and will happily process each other's files, so that 16K owners who upgrade to 48K can use their old files immediately. Complete with 12-page manual, priced at £8.95.

PLEASE REMEMBER TO STATE CLEARLY WHICH VERSION OF MASTERFILE YOU REQUIRE.

for 16K Spectrum **GULPMAN** game of the '.....man' variety with 15 mazes, 4 chasers, laser defence, 9 grades, 9 speeds, demo mode, choice of joystick control. "An extraordinarily good program" raves Boris Allan for Popular Computing Weekly. We think you will agree. £5.95

for 16K ZX81 **GULP 2** almost identical spec to GULPMAN £4.75

for 16-64K ZX81 **THE FAST ONE** is the predecessor to MASTERFILE and is in use all over the world now. Specification is very similar to MASTERFILE. £12.00

Campbell Systems, Dept.(SU),
15, Rous Road, Buckhurst Hill,
Essex, IG9 6BL, England.
Telephone: 01-504-0589

CS

DON'T MISS THIS INCREDIBLE OFFER!

50 GAMES £9.95!

CASSETTE 50 FOR YOUR MICRO

GALACTIC ATTACK
SPACE MISSION
LUNAR LANDER
PLASMA BOLT
STARTREK
RADAR LANDING
ATTACKER
GALACTIC DOGFIGHT
ZION ATTACK
IVASIVE ACTION
OXO
BOGGLES
PONTOON
SKI JUMP
HANGMAN
OLD BONES
THIN ICE

MAZE EATER
ORBITTER
MOTORWAY
FORCE FIELD
NIM
TUNNEL ESCAPE
BARREL JUMP
CANNONBALL BATTLE
OVERTAKE
SITTING TARGET
SMASH THE WINDOWS
SPACE SHIP
JET FLIGHT
PHASER
INTRUDER
INFERNO
GHOSTS

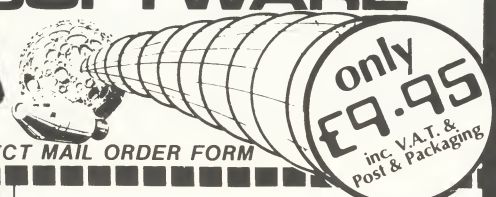
SUBMARINES
ROCKET LAUNCH
PLANETS
BLACK HOLE
DYNAMITE
DO YOUR SUMS
DERBY DASH
SPACE SEARCH
UNIVERSE
RATS
TANKER
PARACHUTE
JETMOBILE
HIGH RISE
THE FORCE
EXCHANGE

CASCADE SOFTWARE

NOW AVAILABLE FOR

sinclair SPECTRUM
ZX81
LYNX
DRAGON
ATARI
apple (ON DISC & CASSETTE)
VIC-20
ACORN-ATOM
ORIC-1
SHARP
NEW BRAIN
BBC A/B

MINIMUM SIZE COMPUTER REQUIRED ONLY



DIRECT MAIL ORDER FORM

CASCADE SOFTWARE
CASCADES HOUSE
BARGAN'S LANE
LLANDOGO
GWENT
S.WALES NP54PA

SUPPLY CASSETTE 50 FOR _____ COMPUTER

I enclose cheque/P.O.

Name _____

Address _____

_____

MAIL ORDER ONLY SU1/3

Competition suggestion

WHILE VISITING computer shops and watching very young children enjoying using computers, I am often amazed how clever many of them are at programming.

We have national and international competitions for chess, snooker, darts and sports but nothing yet in the computer area. Can I suggest you consider a national and perhaps later an international computer competition for different age groups? I am sure it would arouse interest.

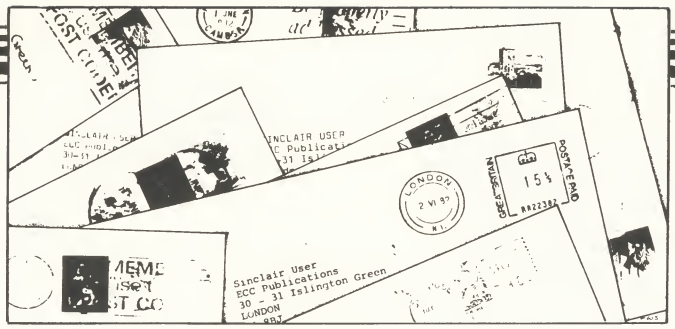
Chris Leslie,
Harrogate.

Minotaur problem

I WOULD like to point out that an error has occurred when my Minotaur program was re-typed for listing in the March edition. In lines 90 and 100 a space was inserted instead of an inverse space. That results in failure to form the vertical borders of the maze and when the program is run the Minotaur promptly walks off the edge of the display, causing a crash. The lines should read:

90 LET M$(M+1,1)="■"
100 LET M$(M+1,31)="■"

Kevin Tutte,
Walmley,
Sutton Coldfield.



Discrepancy in routine

WE MANUFACTURE computing hardware and accessories and are investigating the usefulness of the Spectrum for an application which we are considering. We have found some discrepancy in the non-maskable interrupt routine which may be accidental or intentional. We give the details:

NMI Routine
$66 push af
$67 push hL
$68 ld h1, (NN)
$6B ld a,h
$6C or 1
$6F jp (le)
$70 pop hl
Jump
$6D jr nz, 1 should be jr z,1
$71 pop af

The non-maskable interrupt routine takes the values located at 23728 and 23729 for the interrupt jump. The way in which Sinclair has written the routine it happens only if the contents of the locations is zero, i.e., it will jump to re-set only at location $0000. If the instruction at $6D had been a jrz, D1S (jump on zero) instead of jr nz, D1S (jump on non-zero) then the NMI would jump to any address pointed to by the values at 23728 and 23729, except if that value were zero, when it would be ignored.

We would appreciate your comments and would like to know whether Sinclair intends to correct the problem. Will it mean that all the Spectrums supplied to date will have to be recalled for a ROM change?

S T Currah,
Currah Computor
Components Ltd,
Hartlepool,
Cleveland.

● *According to Sinclair Research the observations you make are correct. As it is not an advertised feature of the Spectrum the company has no plans to correct the ROM until a suitable opportunity arises.*

Avoiding bad habits

YOUR ARTICLE on Memory-saving techniques by David Anderson spells disaster to inexperienced programmers. It encourages the misuse of the Basic language.

Those techniques allow for more complex programs to be run when the amount of memory is limited. The programmer is forced to write incomprehensible code. He may continue to write such code when it is not needed and bad habits may set in. The only way to break such habits is by re-training the programmer in the correct use of Basic.

A more acceptable way to deal with a 1K ZX-81 is to expand the memory. It is cheap and easy to do. Alternatively, replace it with a Spectrum which is well worth the extra cost. John Gilbert's programming course is an excellent aid for developing good techniques.

Chris Powell,
Wembley,
Middlesex.

Helping on the farm

READERS may be interested in our experience of using Sinclair computers which refutes the suggestion often heard that they are not suitable for serious use in small businesses. We have been doing the book-keeping for our farm for more than two years on a ZX-80 and are about to transfer to a Spectrum.

We have also written and used successfully Cash-Flow and Crops programs for the ZX-81. Thanks to the East London Robotics Slowloader — announced in your November edition — we have transferred both programs and their data to the Spectrum; the only difficulty was that some of the numerical data was stored in string arrays, to save bytes, using the CHR$ and CODE functions,

continued on page 18

Maze escape blocked

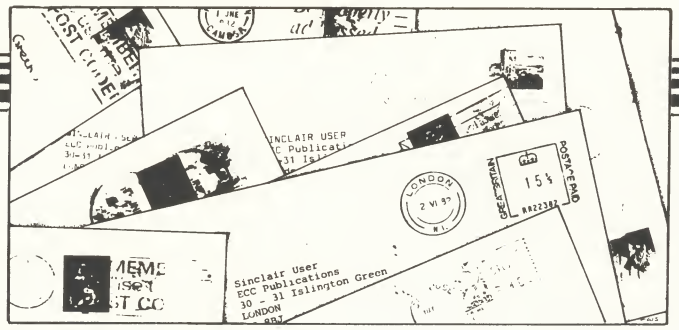
I WOULD like to reply to the letter from Perceval de Montarby in the April edition concerning 3D Monster Maze. From my understanding of the letter, the description violates some of the rules by which mazes are generated. During its writing, 18 months ago, more than 3,000 mazes were mapped. Each complied fully with all those rules. Subsequently, on one occasion, a "great open space in the maze" was consistently but randomly generated.

That was traced to a spurious bit being added to the code, causing the checks to be by-passed. As most ZX-81 owners are aware, it is possible to have an apparently correct load with spurious bits added. On that occasion re-loading at a lower level solved the problems.

The information concerning the whereabouts of T Rex has always been consistent with his relative position and the twists in the maze.

My new company, New Generation Software, has just taken-over marketing of the game and my two other games for the ZX-81. I shall be looking closely at the marketing of the products. I would like to point out, however, that a software house can only recommend a retail price and cannot enforce it.

Malcolm Evans,
New Generation Software,
Bristol.



Balancing the model demands

continued from page 17

but since the ZX-81 and Spectrum character codes are different we had some very strange data at first. When the Microdrive is available we hope to integrate all the programs into a single package costing far less than the systems available at present to farmers.

Both our Spectrums produce a defective print on our printer when the <LIST statement is used. The lowest (6th), line of the printed pixels of each character is printed one or two pixels before it should be. It does not do it on COPY. Has anyone else experienced this? Is the fault in our printer or our computers?

P Banks,
Crows Hall Farms,
Debenham,
Suffolk.

Microfair crush

REGARDING the sixth ZX Microfair, is it not about time that the organisers considered a more spacious venue? The New Horticultural Hall is far too small for such a popular event; in fact, conditions could be better at a local church jumble sale.

After spending about two hours trying to push through a mass of heaving bodies, I gave it up as a bad job. It was very difficult to see what the exhibitors were trying to display and at times the side aisles were practically impassible.

D R Franklin,
Brockley,
London SE4.

● *The organiser says that it is difficult to estimate the numbers likely to attend the fairs. He could limit numbers by increasing admission prices and to choose another bigger, hall would also increase costs. He does not wish to do either, because that would limit the numbers of people and the goods which they were able to see.*

I HAVE been reading *Sinclair User* for several months now and considered it excellent value for money — until the March issue.

The front cover states *Sinclair User,* incorporating *Spectrum User.* From the articles inside it would appear to be *Spectrum User* — incorporating occasional articles for ZX-81 users. That may seem harsh but Software Scene contained eight reviews, all for the Spectrum; Mind Games was devoted entirely to a Spectrum adventure which is not available for the ZX-81.

I know more and more people now own Spectrums but there are still thousands of ZX-81 owners who buy the magazine. So please give us equal rights; we do not want to feel like second-class citizens.

S J Rhodes,
Caddington,
Luton, Beds.

● *We appreciate the difficulties of catering for two very popular machines. The problem with Software Scene in recent months has been the result of the small amount of new software being produced for the ZX-81. We have reviewed more programs for the machine in this issue and intend to give priority to new ZX-81 software in future.*

I AM writing to complain about the lack of 16K ZX-81 programs in your magazine. I know that you have had complaints about the lack of Spectrum programs but that does not mean you have to omit the 16K ZX-81 programs. Perhaps in future you could publish an equal amount of programs for the Spectrum AND 16K ZX-81?

D Windsor-Martin,
Cheltenham, Glos.

AFTER buying the February issue I felt compelled to write to ask you why the cover price has risen by 15 pence.

I would like to ask you if it is possible to include more 1K ZX-81 games programs.

Martin Betts,
Eastbourne,
East Sussex.

● *With a limited amount of space it is impossible to keep everyone happy but we are always aware of the situation and will attempt as fair a balance as possible.*

Spectrum issue clues

COULD you tell me how to determine whether my 16K Spectrum is an Issue 1 or Issue 2 computer? I wish to update to 48K in the near future and all the advertisements in your magazine indicate that one must specify whether the Spectrum is either Issue 1 or 2.

I have read your magazine since its July issue and have been greatly impressed with the ever-improving quality of your program pages. Well done and thank you very much.

Mark Staniford,
Liverpool College,
Liverpool.

● *A resistor has been omitted from the new issue two board. Also the circuitry on the PCB is all on the board and there are no protruding wires as there were on issue one. If you look through the back slot of the Spectrum and everything is reasonably flat on the PCB you have a model two. If, however, you can see wires leading from the board you have a model one.*

Amplifying sound

I OWN a Spectrum but I find one of its main flaws very irritating. I have discovered how to amplify the sound through the cassette recorder.

The EAR and MIC plugs should be plugged into their places on the computer. The other EAR socket should be plugged into the MIC socket of the cassette recorder. The cassette recorder should then be set to PLAY then paused via a PAUSE button. If the cassette recorder has a PA system the sound can be amplified to unbelievable heights.

One sound I have no wish to amplify is the one made by the AC adaptor when plugged in. Do other Spectrum owners have this constant buzzing which is audible over the low buzzing of the Spectrum? Or is there something wrong with my AC adaptor?

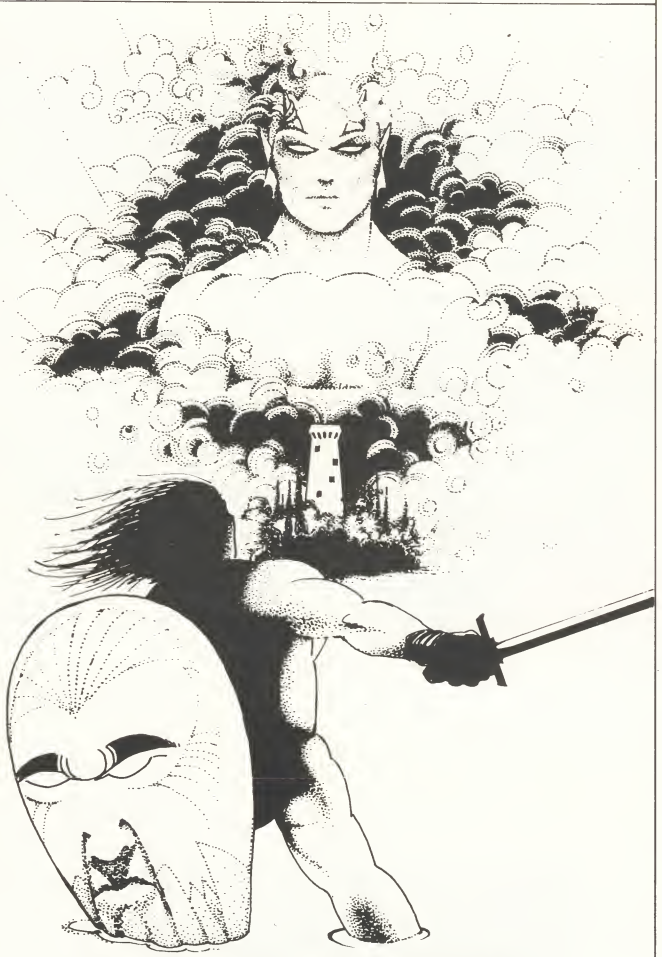
Sarbjit Gidda,
Spondon,
Derby.

Bridge record

AFTER I had seen **London Bridge** in the December issue, I programmed it and played it many times. In the February issue I read that Owen Nurse had scored a total of 2,050 on the game. That made me determined to improve on that score and I reached 500 more, i.e., 2,550 with three bricks remaining. I am nine, one year older than Owen.

Paul Murray,
Newton Aycliffe,
Co. Durham.

SPECTRUM 48K : ZX81 16K
SIX PART ADVENTURE



BLACK CRYSTAL

THE QUEST IS ABOUT TO BEGIN

The ultimate role-playing adventure for the SPECTRUM/ZX-81. You can become a warrior, elf or wizard on a quest to find and use the rings of creation: to destroy the Black Crystal and defeat the Lords of Chaos. Held within six programs lies a land of fabulous treasures and mythical monsters. Journey through the land of Beroth, explore the castle of shadows, descend into the Shaggoths lair, search for diamonds in the sea of sand but beware of sand sharks! Confront the fire demon in his temple, battle against the Lords of Chaos and win your way to the Black Crystal.

By splitting Black Crystal into six programs we can provide more variety and detail than any other adventure for the Sinclair computers.

Real time monster battles. Superb graphics. Save game feature. All six parts are supplied together on cassette, boxed with instruction booklet.

SPECTRUM 48K: 180K OF PROGRAM IN SIX PARTS — ONLY £7.50
ZX81 16K: OVER 100K OF PROGRAM IN SEVEN PARTS — ONLY £7.50
WHY PAY MORE FOR LESS OF AN ADVENTURE

To: **CARNELL SOFTWARE, DEPT 2, 4 STAUNTON RD, SLOUGH. SL2 1NT.**
Please send me: Black Crystal for my,

Spectrum 48K..... £7.50
ZX8 16K..... £7.50

I enclose a cheque/postal order (payable to Carnell Software) for £

NAME.....

ADDRESS.....

.....

TRADE ENQUIRIES WELCOME

VOLCANIC DUNGEON CHAMPIONSHIP

CARNELL SOFTWARE

WIN A FABULOUS wings HOLIDAY FOR 2 TO FLORIDA.

VISIT THE AMAZING NEW EPCOT CENTRE

Volcanic Dungeon, the addictive adventure. People have been known to venture into its maze of caverns to rescue the Princess Edora again and again. If you are one of them, or wish to be, then you could find yourself lying on a **sun-drenched beach in Miami for a week. Followed by a further week at Orlando,** visiting **Disney World** and **Epcot.** So what do you have to do for all this? **Just be the best Volcanic Dungeon player in the UK, that's all!** Ten finalists will battle it out in the championship at the London Computer Fair, Earl's Court, in June 1983. **But first you must prove you are worthy.**

Volcanic Dungeon is available on the **16K ZX-81, 48K Spectrum and Dragon 32.** An entry form is supplied with every game. (Anyone who already owns the original ZX version can enter by sending a SAE for an entry form.) **Order your copy NOW** from **CARNELL SOFTWARE, 4 Staunton Road, Slough, Berks. Only £5.00** including P&P. **Also available from good microcomputer stores.**

The 'Judges' decision is final and no correspondence will be entered into. All business associates of Carnell Software, and their relatives, are disqualified from entry. A copy of the rules of the Volcanic Dungeon championship will be supplied with the entry form.

EVERY ONE A N

ORBITER

ALIEN DROPOUT

CYBER RATS

SLIPPERY SID

INVADERS

THE SILVERSOFT COLLECTION

Silversoft, Masters of the video canvas present the first of a timeless collection of Electrik Artwork for the connoisseur. Our skilled artists have toiled over their electronic easels to produce these moving masterpieces - now being exhibited throughout the galaxy. Complete details of these classic programs may be found in our fully illustrated catalogue.* Your local software gallery can arrange a viewing - so beam down there and pick up an original. Don't forget Silversoft still deliver direct to anywhere in the known universe (Post Office willing). If your local (art) dealer is out of stock then please contact us straight away.

* A must for serious collectors.

ALSO AVAILABLE FROM BRANCHES OF W.H. SMITH, BOOTS, JOHN MENZIES & ALL GOOD COMPUTER STORES.

Send to: **SILVERSOFT Ltd**
LONDON HOUSE
271-273 KING ST
LONDON W6
TEL: 01-748 4125

Please note: Due to expansion we have moved to larger premises, we apologise in advance for any inconvenience to our customers.

MASTERPIECE

ASTEROIDS

STARSHIP ENTERPRISE

GROUND ATTACK

ZX SPECTRUM SOFTWARE

ORBITER	£5.95		☐
GROUND ATTACK	£5.95		☐
CYBER RATS NEW	£5.95		☐
SLIPPERY SID NEW	£5.95		☐
STARSHIP ENTERPRISE	£5.95	48K ONLY	☐
MUNCHER	£5.95		☐

ZX81 SOFTWARE (16K ONLY)

INVADERS	£3.95	☐
ASTEROIDS	£3.95	☐
ALIEN DROPOUT	£3.95	☐
MUNCHER (ZX81)	£4.95	☐
STARTREK	£3.95	☐
ZX COMPILER	£5.95	☐

Response Coupon

Tick box(es) as required

I enclose a cheque/PO for .....

Name.....

Address .....

.....

.....

I require a free catalogue ☐

adapt electronics

WOBBLY RAMPACK

Q. What is 'wobbly rampack'?

A. Ask Sinclair Users. They will tell you about the programs they have lost due to intermittent loss of memory connection resulting in a program 'crash'.

Oxidation of the tin-plated edge connector is the root cause of the problem. The lack of mechanical attachment between the Rampack and the Computer aggrevates this condition. Slightest movement of the rampack can cause a program crash. Improvement of the Rampack case design will not completely cure the problem.

RAMLOK kit from ADAPT Electronics provides the complete cure.

The kit replaces the tinned connector with a reliable high quality gold-plated version and provides an ingenious simple mechanical clamping device which clamps the Rampack to the Computer but is simple and easily released.

- RAMLOK kit is easily fitted requiring no specialist knowledge or skills.
- No cutting or drilling necessary.
- No special tools required just a soldering iron.
- Step by step instructions included.
- Access to the computer after modification is unaffected.
- Suits ZX81/80. Spectrum version available shortly.
- Suitable for all popular RAMPACKS including Sinclair 16K.

PRICE £7.50 + 50p p&p inclusive

Please send ..... RAMLOK kits.

I enclose cheque/PO value £.....

Name .....

Address .....

.....

.....

ADAPT Electronics, 20 Starling Close, Buckhurst Hill, Essex IG9 5TN.

R & R

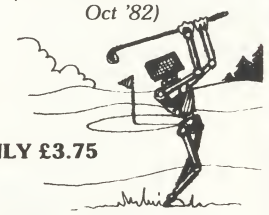
STAR TREK 48K

Rid the Galaxy of the evil Klingons, Protect your Star Bases from attack. *("Easy to play. Difficult to beat". Sinclair User Dec '82)*

ONLY £4.95

16K Spectrum GOLF

Hi-Res Full colour graphics. A game for 1 or 2 players, All the features of a full size course. THE family game. *(Reviewed Sinclair User Oct '82)*



ONLY £3.75

P-E-P

THE PROGRAM ENHANCEMENT PACKAGE FOR THE ZX81 (16K)

A suite of easy to use machine code routines designed to transform your Basic programs.

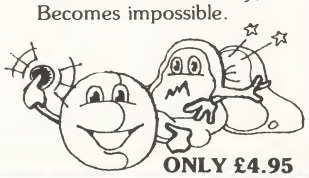
■ **DEFINED SCROLL REGION** 1 line to whole screen ■ **SCROLL** up or down ■ **FILL SCREEN** any character ■ **CHANGE BACKGROUND** ■ **CHANGE FOREGROUND** ■ **INVERSE VIDEO** ■ **FLASH SCREEN** ■ **CLEAR SCREEN** without changing print position

Supplied on tape with a **6K DEMO PROGRAM** and a FULL instruction booklet

ONLY £5.95

GNASHER 16K

THE ULTIMATE MAZE GAME. Ghosts, Energy Pills, Bonus Fruit, Sound, Colour + much more. Starts easy, Becomes impossible.

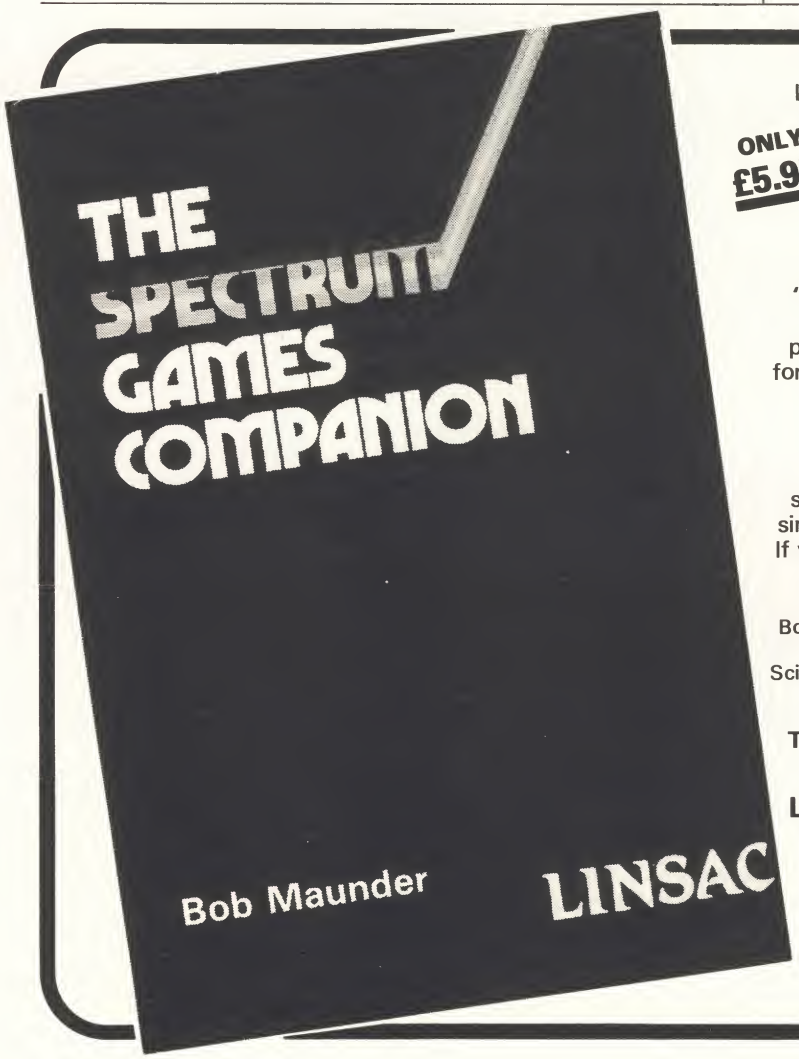


ONLY £4.95

Send to: **R & R SOFTWARE (SU)**
34, Bourton Road,
GLOUCESTER GL4 0LE
Tel: GLOS (0452) 502819

48 HOUR DISPATCH
Overseas +10% please
Large Dealer Discounts

ZX SPECTRUM



Linsac's ZX Companion series has received excellent press reviews:

ONLY £5.95

"Far and away the best" — *Your Computer*

Thoughtfully written, detailed and illustrated with meaningful programs ... outstandingly useful" — *EZUG*

'The Spectrum Games Companion' is the latest addition to the series and is aimed at the games player and programmer alike. Twenty-one games designed specifically for the ZX Spectrum are included, with clear instructions on entry and play. Each program is explained fully with complete details on how it is designed and written. Introductory chapters show how to set up and use the Spectrum and how to create your own games. Later sections cover number games, word games, board games, simulation games, dice games, card games and grid games. If you want to enjoy your ZX Spectrum and learn its secrets at the same time then this is the book for you!

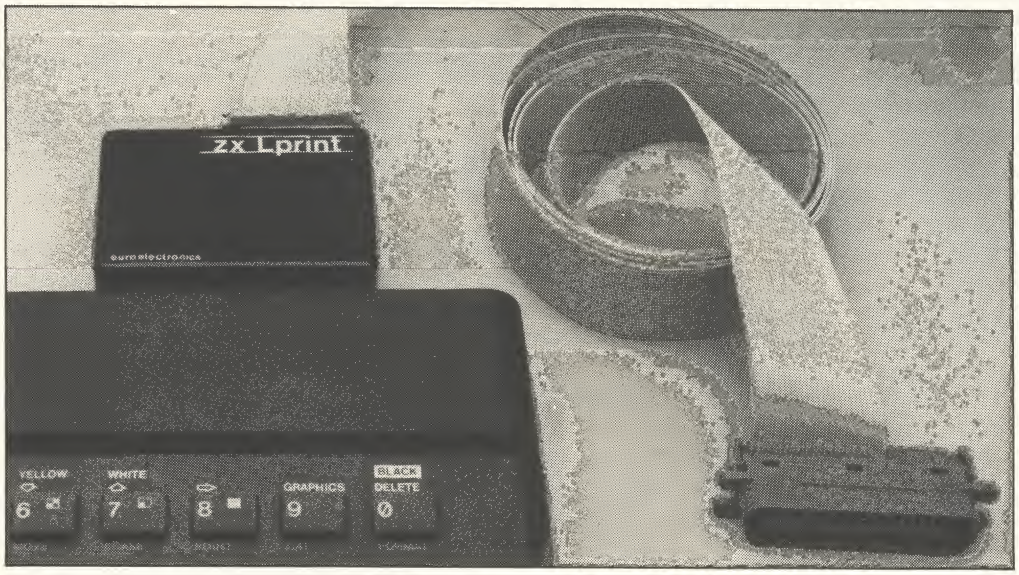
Bob Maunder is co-author of 'The ZX80 Companion' and author of 'The ZX81 Companion'. He is a Senior Lecturer in Computer Science at Teesside Polytechnic, holds an MSc degree in Computer Science, and is a Member of the British Computer Society.

The Spectrum Games Companion is available from good book shops, or send £5.95 to:

LINSAC, (SU) 68 Barker Road, Middlesbrough, Cleveland TS5 5ES

Postage is free within the U.K. — add £1 for Europe or £2.50 outside Europe.

ISBN 0 907211 02 X



Spectrum can now link to Centronics

LPRINT is not only a Sinclair keyword but the name of a printer interface for the Spectrum. The small black box, 2½in. by 2in., plugs into the expansion port on the Spectrum. Thereafter all LLIST and LPRINT commands are converted to a Centronics parallel interface on the back. By plugging-in a standard 20-way cable to its pins a standard plain-paper printer can be used.

Any Centronics printer can be used, as any graphics, user-defined characters and the like have to be programmed in by the user — each printer has ways of doing graphics and special characters. The instructions are so simple that they are printed on the bottom of the unit.

The same firm can also supply a tape with a program for using the COPY command. GP100 was used to reproduce every dot on the screen using a routine of only 76 bytes stored above RAMTOP.

A modification must be made before using LPRINT, as the printer would normally output a new line after every carriage return — ENTER — character. That facility must be removed so that it gives a new line only when the printer interface tells it to do so. The printer manual will undoubtedly cover that and there is a warning built into the COPY program. Sometimes all that is required is to throw a switch or insert a wire between two terminals.

The LPRINT graphics routine for COPYing the screen is its best feature. Its worst is that you cannot set the line length on LLIST, so it prints the line until it reaches the end of the line or exceeds the length of the printer paper.

The other thing about LLIST and LPRINT is that it ignores graphics and other non-recognisable characters. So a string with three graphics characters will print as an empty string — no spaces. It would be much better to print a space so that the graphics could be filled-in later by hand.

All the control for the printer is stored in a 2K ROM inside the box along with seven ICs. No user RAM is used unless the COPY command is required.

The LPRINT module costs £41.40, plus the printer cable at £12.08. The COPY tape costs £5. Euroelectronics is at 29 Clarence Square, Cheltenham, Gloucester. Tel: 0242-582009.

Printer improved

THE ZX Printer Spool solves a problem which bedevils Sinclair users. The aluminium spindle and two end-pieces are fitted to the paper roll and allow it to turn easily. The plastic ends on the printer are often loose and cause it to wander from side to side, preventing the printer motor pulling through the paper.

It solved the problem but only after tapping one end of the paper reel on a hard surface to get it back into line.

The results are much better printout both for graphics and text, plus a great saving in printer paper.

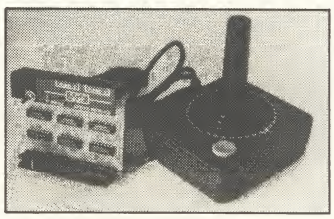
The ZX Printer Spool costs £4 and can be obtained from Sadlers Developments, Sadlers, Vicarage Lane, Send, Woking, Surrey GU23 7JN.

Kit prevents the wobbles

ADAPT ELECTRONICS has produced a RAMLOK kit to prevent the Sinclair RAM pack wobbling on the ZX-81. It consists of a female edge connector plug which has to be soldered on to the expansion port of the ZX-81 and a mounting bracket which is attached to both the ZX-81 and the RAM pack by double-sided sticky tape.

There are two plastic blocks included in the kit, one for the Sinclair type and one for other types. The two pads stuck on to the ZX-81 have holes so that a steel pin can bolt all three blocks together firmly. The RAM pack can be the only item used on the back of the ZX-81 but you can detach it by removing the pin. The edge connector is gold-plated to prevent corrosion.

The system seems to work well but does not allow for the printer or any other device to be used. It also invalidates your Sinclair guarantee. If you have that problem and you want to use only the RAM pack the RAMLOK kit costs £8 from Adapt Electronics, 20 Starling Close, Buckhurst Hill, Essex IG9 5TN. Tel: 01-504 2840.



Atari joystick interface

AGF has now modified its joystick interface to accept standard Atari joysticks. The interface allows you to simulate the cursor keys on a Spectrum or ZX-81 plus a second set of keys for a second player.

Much software uses cursor keys and AGF provides some demonstration software with

continued on page 24

continued from page 23

each unit so you can look for the cheapest joysticks which can be used on Ataris — there is a range from Le Stick to Competition Pro.

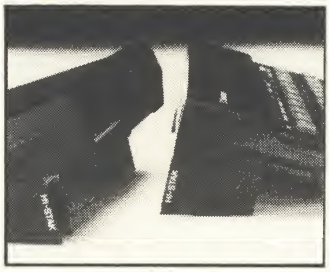
AGF sells the interface at £20 and the address is 26 Van Gough Place, Bognor Regis, West Sussex PO22 9BY. You should indicate which machine you have.

Telford offers ZX-81 upgrade

FOR £42.40 Telford Electronics and Computing will fit your ZX-81 into a Fuller 42-key keyboard and case. It will also add reverse video switch, re-set button, repeat key — on a separate key — and power-on LED. The price includes fitting and postage.

Optional extras include a monitor socket, joysticks and fitting the power pack and 16K RAM inside the case.

For more details, contact TEC at 26a Bradford Street, Shifnal, Shropshire TF11 8AU. Tel: 0952-46008.



Better angle on Spectrum

WARP FACTOR EIGHT sells the Hi-Stak, plastic blocks to raise a ZX-81 or Spectrum to an angle suitable for typing. They raise the Spectrum by about 30 degrees and stick on the bottom of the case at the back by double-sided sticky pads. They are a little expensive at £3.95 inc. VAT and postage but if you want to have style and do not wish to add anything at the back — the edge connector finishes 1½in. off the table and can cause wobble — use it.

Warp Factor Eight is at 6 Pelham Road, Braughing, Ware, Herts SG11 2QU. Tel: 01-452 7782.

Easy-to-use printer link

KEMPSTON MICRO-ELECTRONICS has produced a Centronics printer interface which plugs on the back of the Spectrum. There is nothing spectacular in the box as it is an 8255 chip used as a port to access the printer cable.

The printer cable is a full 35-way type and is about one metre long. The plug at the end which fits on the printer seemed a little too thick to put the securing clips around but it was a tight fit in the socket.

All the hard work is done in 650 bytes of machine code stored above RAMTOP; a different program is provided for each computer. That may seem a great deal but the accompanying Basic program allows you to specify a number of options on the printer. Once those options are set, the program will save the machine code only to allow you to use all the rest of the RAM yourself.

Line length, changing the character codes for individual characters, special features such as the line feed and carriage return, can be set in software. All those commands affect only LPRINT and LLIST as COPY is ignored.

Any of the options can be ignored by pressing ENTER in response to the question. In that way a printing routine can be personalised and if, say, the line length is limited to 32,LLIST would produce a duplicate of that listed on the screen.

Hilderbay, the company which produced the software, must be congratulated on providing a fine, easy-to-use piece of software.

The only way to COPY a screen suggested in the instructions is to use the Basic Point command in a loop to assemble the required graphic bytes to put out to the printer. That is useful but slow and the routine applies only to Epson printers. Looking through the printer manual is the only answer if you do not have one of those.

A machine code program for at least two of the popular printers to simulate, if not use the COPY command, would have been useful. That seems preferable to the LPRINT, is it allows you control of the printer with as much ease as possible.

The printer interface costs £45 and is available from Kempston Microelectronics, 180a Bedford Road, Kempston, Bedford MK42 8BL.

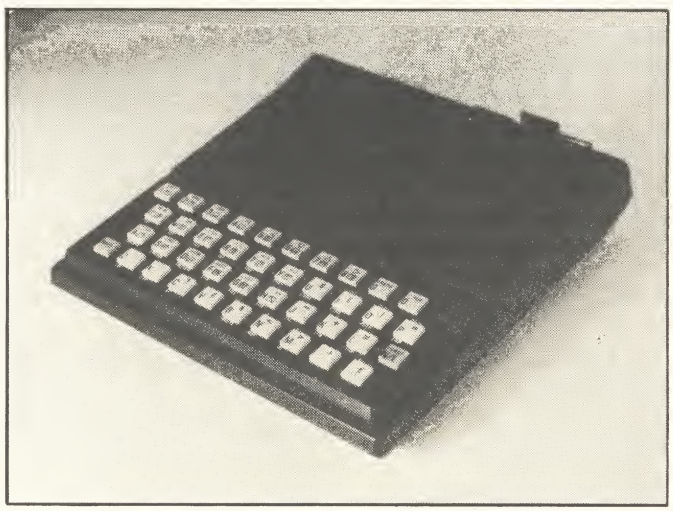
Cheaper keyboard

THE FILESIXTY button set is cheaper than a real keyboard and yet offers the same advantages. The keys move and the Sinclair keyboard has a positive keypress. The button set is the same size as the Sinclair keyboard and is stuck over the top of it with double-sided sticky tape. It does not invalidate the guarantee, require soldering, or need you to go inside the case.

The buttons have on the underside a nylon flap with a knob on it. The knob is centred over the Sinclair key and when not being pressed holds the button above the keyboard. When the button is pressed the key moves down about 2mm. and the knob strikes the keypad. That works very well.

The keyboard has a black surround to blend with the ZX-81 and the keys are nearly all white with black lettering, making them easy to see. The number keys are coloured blue, SHIFT and NEW LINE keys orange. The keys are only 8mm. square, which makes them easy to use.

The graphics on the keys, however, have been changed, so that solid blocks of black are represented by lines indicating the area covered. That and the fact that some of the key symbols have been changed may create initial difficulty, but should be no problem after use for a week or so. The cost of the Filesixty button set is £10 and it should last as long as the Sinclair keyboard. Filesixty can be obtained from Fox Electronics, 141 Abbey Road, Basingstoke, Hampshire RG21 9ED and some shops.



SPECTRUM NEWS FROM ELR

EAST LONDON ROBOTICS

Just received your Issue 2 Spectrum? No point in looking any further – we have the products you need at the prices you expect.

SP48
32K Memory extension
(giving total of 48K. Upgradeable to SP80)

£25

SP80
64K Memory extension
(giving massive 80K)

£50

Both the SP48 and the SP80 fit inside the Spectrum case, are fully compatible with all Sinclair add-ons (ZX Printer, RS232, Microdrive etc.), are very low in power consumption, require no soldering, are easy to fit and remove and carry our full guarantee.

Transfer your ZX81 BASIC and machine code programs and data onto your Spectrum in minutes with the fabulous new

ZX SLOWLOADER

SOFTWARE PRODUCT OF THE YEAR

£10

This superb piece of software enables your Spectrum to LOAD programs from ZX81 tapes and automatically converts them to 'Spectrumese' ready for normal Spectrum SAVEing.

ORDERS & ENQUIRIES

Send s.a.e. for **FREE** catalogue to: East London Robotics, Gate 11, Royal Albert Dock, London, E16
Tel: 01 471 3308 for 24 hr automatic information.

Prices include VAT Please tick if you require VAT receipt ☐

Please rush me	Item description	Quantity	£	p
			P & P	45

I enclose cheque/PO payable to East London Robotics for TOTAL £ _____

Name Mr/Mrs/Miss _____ Address _____

EAST LONDON ROBOTICS — THE OPTIMUM SOLUTION

DON'T MISS THIS INCREDIBLE OFFER!

50 GAMES

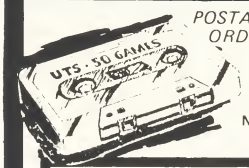
£9·95

YES, 50 GAMES!

on cassette for all the following:

GALACTIC ATTACK	MAZE EATER	SUBMARINES
SPACE MISSION	ORBITTER	ROCKET LAUNCH
LUNAR LANDER	MOTORWAY	PLANETS
PLASMA BOLT	FORCE FIELD	BLACK HOLE
STARTREK	NIM	DYNAMITE
RADAR LANDING	TUNNEL ESCAPE	DO YOUR SUMS
ATTACKER	BARREL JUMP	DERBY DASH
GALACTIC DOGFIGHT	CANNONBALL BATTLE	SPACE SEARCH
ZION ATTACK	OVERTAKE	UNIVERSE
IVASIVE ACTION	SITTING TARGET	RATS
OXO	SMASH THE WINDOWS	TANKER
BOGGLES	SPACE SHIP	PARACHUTE
PONTOON	JET FLIGHT	JETMOBILE
SKI JUMP	PHASER	HIGH RISE
HANGMAN	INTRUDER	THE FORCE
OLD BONES	INFERNO	EXCHANGE
THIN ICE	GHOSTS	

sinclair SPECTRUM
apple (ON DISC & CASSETTE)
ACORN·ATOM
BBC
DRAGON
ATARI VIC 20
SHARP
ORIC-1
NEW BRAIN
ZX81 LYNX



POSTAGE FREE TO U.K.
ORDER DIRECT TO:

U.T.S.
P.O. Box 96
HARROGATE
NORTH YORKSHIRE
HG3 2UZ

PLEASE SEND ME _____
CHEQUE ENCLOSED, VALUE _____
NAME _____
ADDRESS _____
POSTCODE _____ G

cut & post now

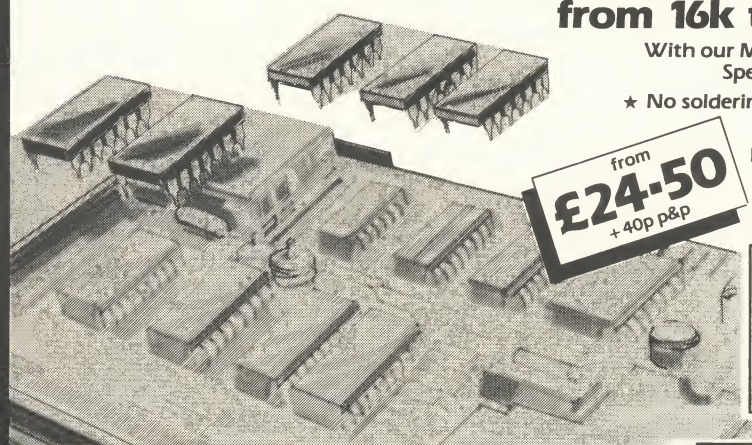
FABULOUS!

SPECTRUM ZX ADD-ON OFFER

from 16k to 48k or 80k

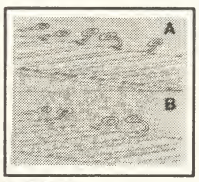
With our ME48 and ME80 memory expansion add-ons your ZX Spectrum can increase its capability by up to five times.

★ No soldering ★ easy to fit ★ simply plug in ★ fully guaranteed ★ no loss of memory through wobble or white out.



from £24·50 +40p p&p

NB. Before ordering your Spectrum add-on please check which Spectrum you have in your possession. The diagram below clearly indicates the different specifications between the series A and B.



At the back of the ZX Spectrum, the metallic contact strips can be clearly viewed. In the series A the space separating the strips is the same width as the strips. In the series B the strips are twice as wide as the space between.

ME48 Series A £34.50
Series B £24.50

ME80 Series A £49.50
Series B £49.50

COMPUTER ADD ONS

7-9 Thane Works, Thane Villas London N7

Please tick the appropriate box to order your Computer Add-on. ME48 Series A ☐ Series B ☐
ME80 Series A ☐ Series B ☐
I enclose a cheque or postal order for _____ made payable/crossed to Computer Add-ons, or I would like to pay by Access ☐ or Barclaycard ☐ and I enter my number accordingly. - Allow 28 days for delivery

Name _____ Occupation _____ Address _____ SU2

COMPUTER ADD-ONS
7-9 Thane Works, Thane Villas London N7

EXPLORING SPECTRUM BASIC
Complements the Sinclair manual by explanations of BASIC programming techniques supported by over 50 full games & serious programs. 191 pages. £4.95

THE EXPLORERS GUIDE TO THE ZX81
The book for the ZX81 enthusiast. 152 pages of games, application and utility programs plus much useful information on machine language and hardware. "Immediate and lasting value" (P.C.W.). £4.95

Available from leading bookshops and computer stores, or direct from Timedata (U.K. P&P free, overseas customers add £1.50 per item for surface mail).

TIMEDATA Ltd. Dept. H
16 Hemmells, Laindon, Basildon, Essex. SS15 6ED
Tel.: (0268) 418121

TIMEDATA

ELECTRONIC
Klik Keyboard
AN ALTERNATIVE NOT AN ADD ON

Installed in 3 easy steps . . .

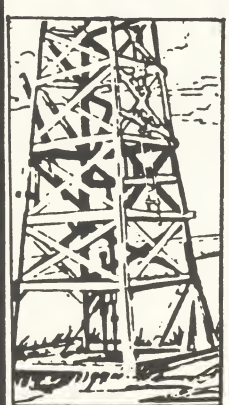
1. Peel of the touch sensitive key pad.
2. Plug in Klik-Keyboard (no soldering) and place in position.
3. Apply self adhesive two-colour legends to the keys.

This full 40 key keyboard has a positive click feel as the keys are depressed but as it replaces the original touch pad it becomes a permanent part of the ZX81 without bulky boxes or trailing wires.

KEMPSTON
MICRO ELECTRONICS
Dept SU5, 180a Bedford Road, Kempston, Bedford MK42 8BL.

C.C.S. MANAGEMENT GAMES

16K ZX81
Spectrum



DALLAS
A game of oil exploration and exploitation in Texas. Decisions are required on purchasing concessions, the movement and use of drilling rigs, and the building of platforms and pipelines. Can you take-over the Ewing Empire, or will you be taken-over in the attempt!

AUTOCHEF
As MD of a Catering Company you must negotiate for leases, decide on menu prices, level of wages, advertising and dividends. Each year you must predict the inflation rate. You will be made to resign if you are not successful. There are 3 levels of difficulty.

AIRLINE
Can you compete with British Airways? You must decide on the number of aircraft to operate, whether to buy or charter, and the levels of staffing and maintenance. Problems encountered are tax demands, strikes, cancelled flights, hijacks and aircraft crashes.

PRINT SHOP
You own a small printing company and are required to decide on (a) the number and type of staff you employ and when to increase or reduce staff (b) the amount and type of paper you stock (c) the week in which work is scheduled (d) the quotation for each. There are 3 scales of difficulty.

NEW **FARMER** is a simulation for running a large wheat farm. Decisions are required on when to plant, irrigate, fertilize, spray and harvest your land and whether to purchase seed corn, land or farm machinery or whether to employ more farm workers.

ALL PROGRAMS AVAILABLE FOR 16K ZX-81, SPECTRUM 16K AND 48K.

EXCELLENT ROYALTIES PAID FOR SINCLAIR SOFTWARE.

PRICES (MAIL ORDER) ZX81 16K & SPECTRUM 16K, £5 for 1, £8.50 for 2, £12 for 3 £15.50 for 4 & £19 for 5.
SPECTRUM 48K, £6 for 1, £10.50 for 2, £15 for 3, £19.50 for 4 & £24 for 5.

TO ORDER Please state computer type and send cheque to:-
DEPT.S., CASES COMPUTER SIMULATIONS 14 LANGTON WAY, LONDON SE3 7TL.

RETAIL STOCKISTS

LONDON	Buffer Micro Shop, 310 Streatham High Road, SW16.	**IPSWICH**	Brainwave Micros Ltd, 24 Crown Street.
	Data-Assette, 44 Shroton Street, NW1.	**LEEDS**	Dragon Byte, 51a Queen Street, Morley.
	The Games Centre, Oxford Street & Regent Street W1.	**LEICESTER**	Microware, Unit 5, St. Peters Lane.
BATH	Micro Style, 29 Belvedere, Lansdown Road.	**MANCHESTER**	J. M. Computers, 136 Park Lane, Whitefield.
BOURNEMOUTH	Zedxtra, 5 School Lane, Kinson.		Micro-Link, 830 Hyde Road.
BRIGHTON	Gamer, 25 Gloucester Road.	**NEWBURY**	Micro Style, 47 Cheap Street.
DAVENTRY	Micro Style, 67 High Street.	**NEW ELTHAM**	Kayde Home Computers, 1 Station Approach.
		NORFOLK	Kayde Electronics Ltd, The Conge, Great Yarmouth.

Success in the stars for Steller

THE PATTERN of the stars of destiny looks good for Steller Services which is producing computer programs for the Spectrum and ZX-81 to help budding astrologers. The first cassette in the series calculates ascendant, mid-heaven, planet positions and planetary aspects using the equal house method, which is common in the world of astrology.

The chart can be constructed with a fair degree of accuracy for any time and any place in the world.

Accuracy is something the author of the program is trying to improve all the time. For that reason the program has been amended several times, although users are welcome to talk to the company and the after-sales back-up is good.

The company claims that several professional astrologers are using the program to make the drawing of charts for clients faster and more accurate. The program is not a toy and anyone who buys it for a party gimmick will be disappointed.

The good-quality program will work wonders for those who put their faith in the stars. It is available from Steller Services, 8 Fir Tree Vale, Leeds LS17 7EY. It costs £10.

Plenty of 1K action

FIGHTING space invaders, being a spacefighter pilot and zipping around a Pac-man maze are just three of the delights on the Micromega **Arcade Action** cassette for the 1K ZX-81.

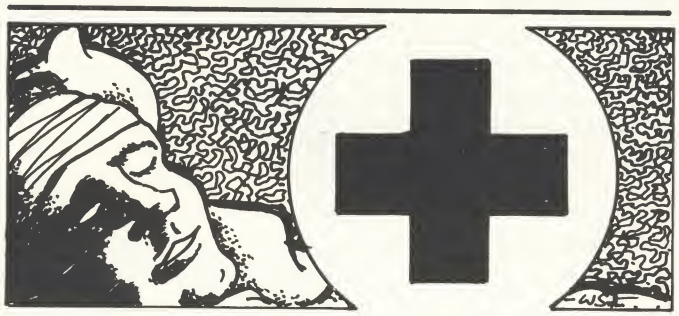
There are five games on the cassette. The first is **Overtaker.** The title gives a clue to what you have to do. You are a racing driver and have to overtake the slower cars on the track. The speeds your supercharged car can attain are amazing, even if you take into account that the program is written in machine code.

The second game is **Missile Man.** You are in charge of a missile battery in space. With your weapons you must destroy the usual enemy invaders. **Spacefighter Pilot** is the third game on the tape. You must protect your mothership from enemy guns which are firing into space from the planet surface below.

Pac-man had to poke its nose in somewhere. **Greedy Gobbler** is the fourth in the series. The controls are difficult to master, as they are set out like a keyboard joystick. When your fingers are positioned on the keypad defined by the program you will have difficulty in hitting the start key.

The final program is named after a rather too-well-known alien, **Extra Terrestrial.** The aliens may seem like ETs but they are intent on destroying a map of the world. The unnerving thing about the game is that you are the nasty alien but if you are of a sadistic turn of mind you may derive some pleasure from the destruction.

Arcade Action is excellent value. It can be obtained from Quantec Systems and Software Ltd, 230–236 Lavender Hill, London SW11 1LE. The cassette costs £4.95



First aid tuition

THE SINCLAIR computers are ideal machines for displaying information to adults as well as children. **The First Aid Program** for the 16K ZX-81 gives the user a self-help course on how to save a life, or how to try to prevent death.

The tuition is given by an animated character who appears at the beginning of the training session, called First Aid Bill. He asks how you would cope with an emergency. When you have failed miserably on that part of the program, Bill will give you a guided tour of the principles of first aid and how to recognise the danger signs in an accident victim. That is the first choice on the main menu shown by the program and takes about 15 minutes.

The other options include a section for revising a part of a subject under such headings as shock, suffocation and broken bones. The list of subjects for revision is very comprehensive.

When you feel confident you can take a test. The computer quizzes you and you can reply, using one or two words as a minimum answer. The computer seems intelligent and understood most of the answers we entered.

First Aid costs £9.95. It is available from Network Computer Systems Ltd, 39 Bampton Road, Luton, Beds.

Good Amba trio

TRIAD is not an ancient oriental sect; it is a series of three games for the 48K Spectrum. The difference between this cassette and others of its kind is that all three games are included in one program and each of the games would sell separately if the manufacturer decided to do so.

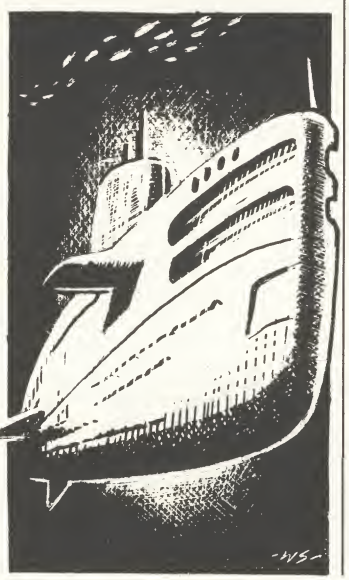
The first game is as original in its title as it is addictive in its playability. It is called **Snackman** and, as you have probably guessed, you take the part of a little creature with a big mouth which eats its way around a maze while being pursued by a variety of ghosts.

The ghosts in Snackman are very intelligent and very fast. If you make one mistake you are dead.

The second game is **Sub Track.** We reviewed it last month as Amba Software has produced it separately so that 16K Spectrum owners can play it. It is a good ploy, as many people still have the 16K machine.

The third **Triad** game is a maze quest where you have to move a little man around the maze and pick up the treasure which has been strewn around the tunnels. The game is simple to play and is very addictive. There are various levels of maze and they range from the easy, with few obstacles in your way, to the complicated, with winding tunnels and invisible barriers.

Triad is priced at £9.50. It is available from Amba Software, Freepost, Cambridge CB3 7BR.



Spotting the birds

PROGRAMMERS are going further afield to find uses for the 48K Spectrum. Hilton Computer Services has just launched an 'expert' system, called **Garden Birds.** It will allow budding ornithologists to identify birds they have spotted with a pair of binoculars in a field.

The program starts by giving the country code with suitable and very interesting bird graphics. Then there is a long wait while the rest of the program loads.

When loading is complete, the computer will show the names of the birds in its data bank. The user must then enter the markings and the behaviour of the bird which has been seen. Users must be willing to enter plenty of data, including size, colouring and call sign of the bird. The ornithologist computer will then process the data and a reading will be given.

We found the general reliability of the system to be accurate with the commoner birds. For instance, the computer can spot a blue tit.

When the analysis has been made you can compare the subject bird to other birds on the menu. You will score depending on how closely your subject bird compares to the other birds.

Garden Birds is an ideal piece of software for the bird-spotter. It is available from Hilton Computer Services, 14 Avalon Road, Orpington, Kent BR6 9AX. The program costs £4.95.

Figuring things out

IT IS PLEASANT to see a company which is not afraid to cover a specialised area in the Sinclair market. University Software produces five cassette tapes for students at A level or university standard. The programs are available for the 16K ZX-81 and the 16K Spectrum. Tape one introduces matrix operations. The second explains polynomials. It includes quadratic equations, Newton–Raphson and half-interval search methods.

Tape three deals with integration, using Simpson's and trapezoidal rules.

The fourth tape covers regression. The program can deal with up to 20 independent variables, with standard errors, and also illustrates interpolation.

Tape five concerns linear programming and is capable of handling up to 20 variables and the same number of constraints.

All programs can be bought separately, or as a package costing £30. The first three tapes cost £5.95 and the fourth and fifth £6.95. They are available from University Software, 45C Sloane Street, London SW1X 9LU.

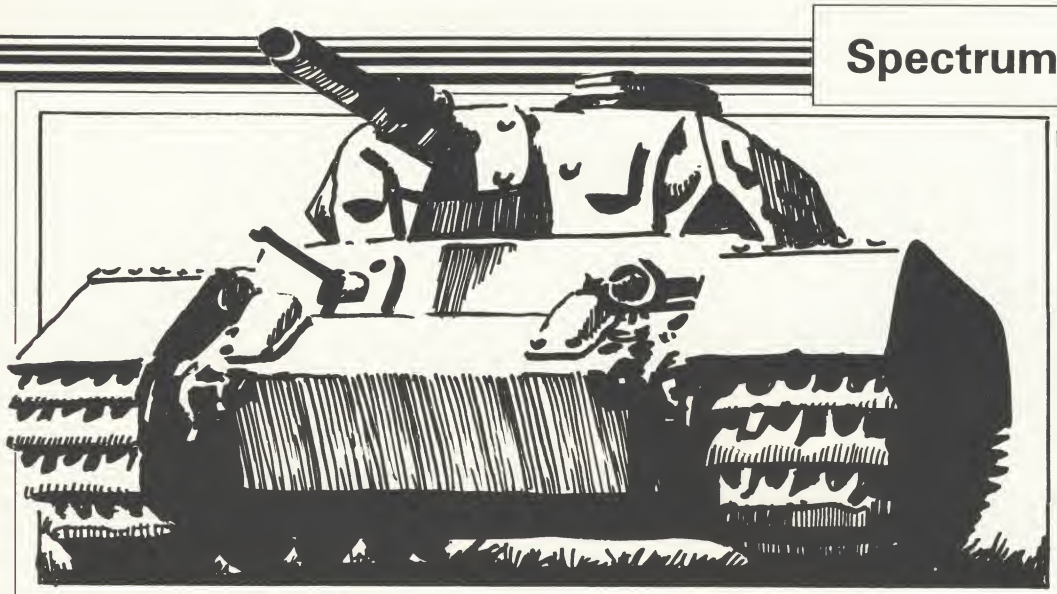
Zombies in space

WE EXPECT you often wonder where space invaders go when they have been wiped from the screen by your laser cannon or smart bomb. You may be surprised to learn that they are brought back to the living-dead and signed-on by MikroGen to take part in a new game for the 16K or 48K Spectrum, called **Space Zombies.**

It is for one or two players and can be played at slow, normal or fast speeds. The aliens look like space invaders but behave like Galaxians, swooping down and releasing their bombs. The aliens also loop the loop and vanish from the sides of the screen on several occasions.

The problem with the invaders is that they behave like real zombies — of the dumb kind — and would win no prizes on Mastermind. In some cases they line up waiting to be killed.

A player continues until a ship is destroyed by the zombies — then it is the turn of the second player. Space Zombies is an interesting and original game. It costs £5.95 and is available from MikroGen, 24 Agar Crescent, Bracknell, Berkshire.



Tank aims for 3D

THE GUN TURRET of your tank is pointed at the deserted bridge. An enemy tank moves silently into your sights and its turret moves threateningly around to point at you. You press the fire button and a salvo of shells lands on the enemy tank, blowing it to pieces.

That is how a new 3D game for the 48K Spectrum, called **3D Tanx,** starts. You can move left and right and move the gun turret up and down. The 3D effect is best seen when you move the turret up and down. The computer allows one or two users to play and it allows you to choose how easy or difficult the game should be. The menu of options also makes it possible to re-define which keys you want to use to move your tank around. The original combination of keys is very difficult to use and it is a good idea to use that option.

The manufacturer of 3D Tanx, DK'tronics also has an exciting version of the arcade game **Centipede.** It is like the original game in almost every way, with bouncing blue spiders, mushrooms and, of course, the deadly alien Centipede. In this version you have three laser bases with which to destroy the Centipede.

Both games are extremely addictive and show that DK'tronics can still produce good-quality software. Both cassettes can be obtained from DK'tronics, 23 Sussex Road, Gorleston, Great Yarmouth, Norfolk. Each game costs £4.95.

Precision logic strategy

COMPUTER LOGIC, strategy and encounters in space are some of the thrills awaiting owners of the 16K Spectrum with three games from Precision Software Engineering. The games are on one tape and are put together under the obvious title of **Games Tape Three.**

The first is **3D Noughts and Crosses.** There are four boards on which to put your nought and each is made up of four by four squares. That means you have three dimensions in which to lose to the computer.

Losing is very easy, as the computer is fast and seems to know what you will do, as well as keeping track of its moves.

The next game is **Tower of Brahma.** It is colourful, uses high-resolution graphics, is difficult to beat, and is very standard for a computer game.

Wipe Out is a board game for two players. The players have to out-manoeuvre each other and wipe a series of noughts and crosses from the board to gain points.

We regard the last game on the tape, **Astro Wars,** as the most important piece of software in this release. The game is played in three sections and takes its action from the films *Star Wars* and *The Empire Strikes Back.* The sequences are fighting the imperial fighters; destroying the Death Star; and battling the Imperial Walkers. All of those sections are in 3D and movement is smooth and fast.

All four games cost £6.95 and the tape is available from Precision Software Engineering, 20 Shelton Avenue, Newark, Notts. NG24 4NX.

Finely-tuned assembler by Aspect

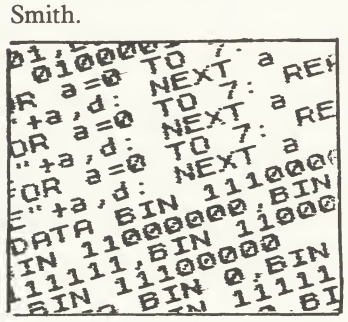
THE RELEASE of the **Aspect** assembler for the 16K and 48K Spectrum has been delayed several times during the last few months. The result is a finely-tuned and powerful assembler/editor package.

As well as the assembly facility, Aspect has a great deal of flexibility in editing finished programs. It is possible to run backwards and forwards through a program line by line. The editor will also search, or hunt, for specified text strings which are to be used on the screen so that the user can check them before running the program.

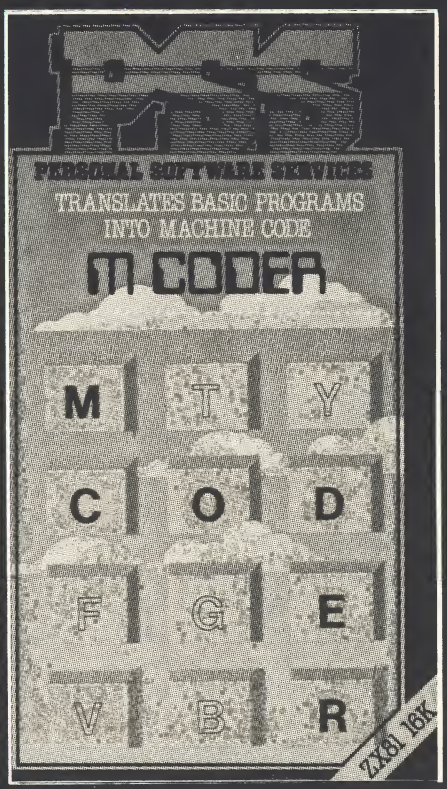
A specified number of lines can be deleted by the editor if a user decides that some code is redundant. The program can also be deleted if a user decides that a program is incorrect and wants to start again without having to crash back into Basic and re-start.

Aspect is powerful because a machine code programmer can treat an assembler code program almost as if it were Basic. That is possible because of the use of line numbers to identify separate lines of code, rather like those which are used in Basic listings.

Aspect is an ideal tool for machine code programmers although, because other assemblers have been available for some time, Bug Byte may have lost the lead in this market. The assembler/editor costs £9 and is available from retail outlets such as W H Smith.



Arcade Style Games
for the ZX81 16K and Spectrum



M Coder

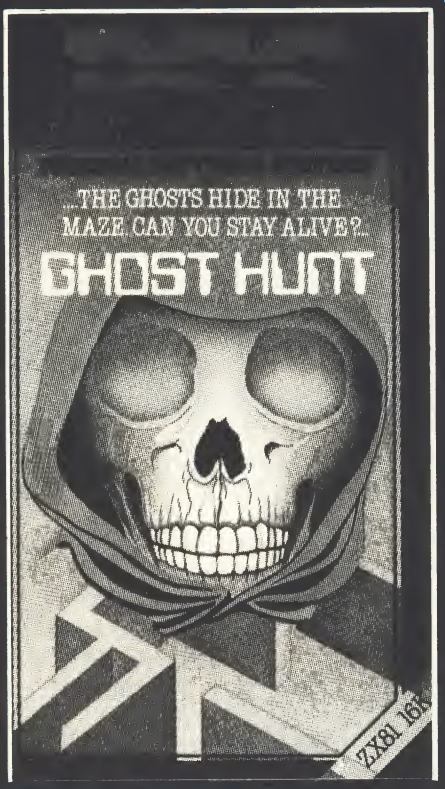
Quite simply the most flexible integer compiler available today for either the 16K ZX81 or the Spectrum 16K/ 48K. M Coder will translate 95% of all non- string basic. The ZX81 version is just over 2K, The Spectrum version just over 3K.
Simply load M Coder, load your basic program or type one, use a print USR command and watch your program being compiled into super fast machine code.

SPECTRUM 16K-48K £8·95
ZX81 16K £7·95

Maze Death Race

Drive through a giant maze, 9 times the size of the screen, picking up points as you go – but watch out for the other cars, rocks oil and ice. Superb machine code game.
Highly recomended.

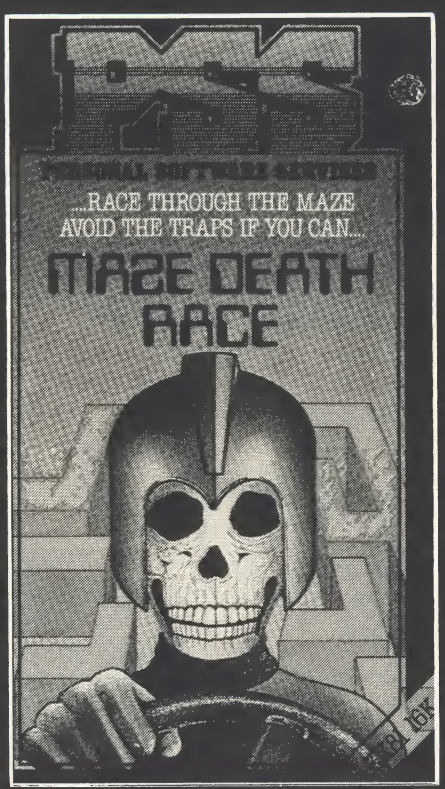
SPECTRUM 48K £4·95
ZX81 16K £3·95

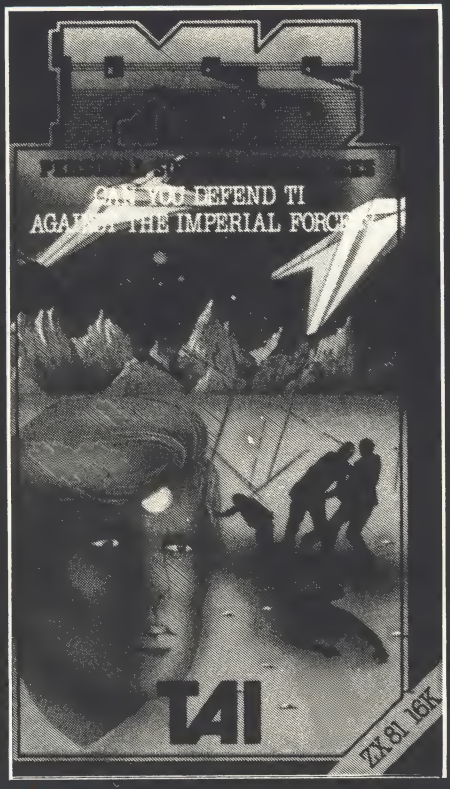


Ghost Hunt

Gobble your way through a maze - Ghosts, power pills etc. All machine code. Super fast action.

SPECTRUM 16-48K £4·95
ZX81 16K £3·95





Tai

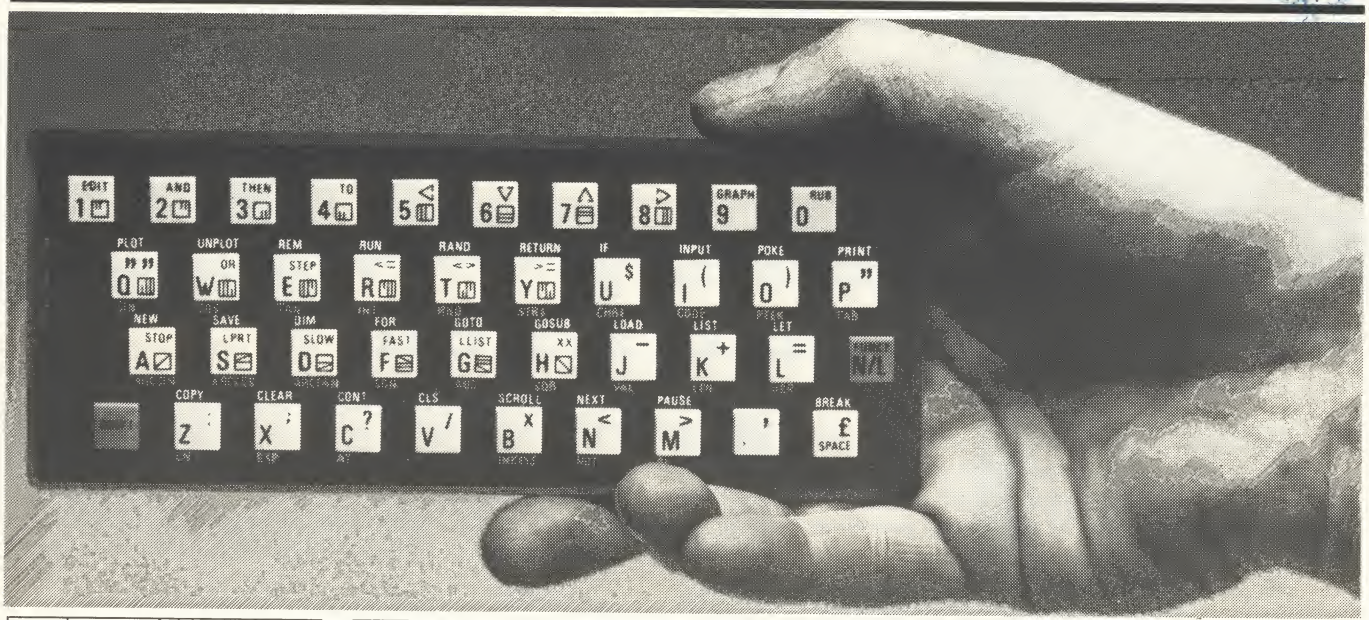
In any other time or galaxy, the dust ball of a world called Tai would have been quite unimportant.
TIMES CHANGE.... Now it is the last remaining out post between the advancing Imperial Fleet and the main planets of the Dorfian system. Unless the Imperial Forces can be held off until the Republican battle fleet arrives, an entire civilization will be betrayed....
You have been chosen to defend Tai, the Galactic future depends on you....

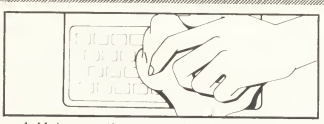
ZX81 16K £4·95

PSS
PERSONAL SOFTWARE SERVICES
SEND CHEQUE OR PO TO
PSS 452 STONEY STANTON ROAD
COVENTRY CV6 5DG

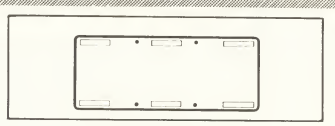
Available from all good Computer Stores or by Mail Order

NOW. A ZX81 PUSH-BUTTON KEYBOARD FOR UNDER £10.

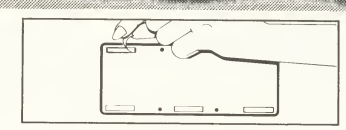




1. Make sure the original keyboard is clean and check that all the keys function.



2. The Buttonset is held in place by self-adhesive pads.



3. So all you do is remove the protective backing.

4. And place it centrally on your ZX81.

At last there's a really cheap but efficient way of ironing out the ZX81's only real bug: its keyboard. The Filesixty Buttonset offers:

■ A full-travel calculator-type moving keyboard for only £9.95. ■ Installed in seconds. The peel-off adhesive backing means you just register into position and press. ■ No messy labels, dismantling or soldering. ■ 3 groups of colour keys to pick out shift, numerals and newline. ■ Precision moulded in ABS to match your ZX81, with contrasting legends for maximum legibility.

Filesixty Ltd., 25 Chippenham Mews, London W9 2AN, England.
Tel: 01-289 3059. Telex: 268 048 EXTLDN G 4087.

Orders to Filesixty Ltd., FREEPOST, London W9 2BR.

Cheques/PO made payable to Filesixty Ltd.

Please send me _____ (qty.) Buttonset(s) at £9.95 each (including VAT and P&P).

Total £ _____ BLOCK CAPITALS

Name _____

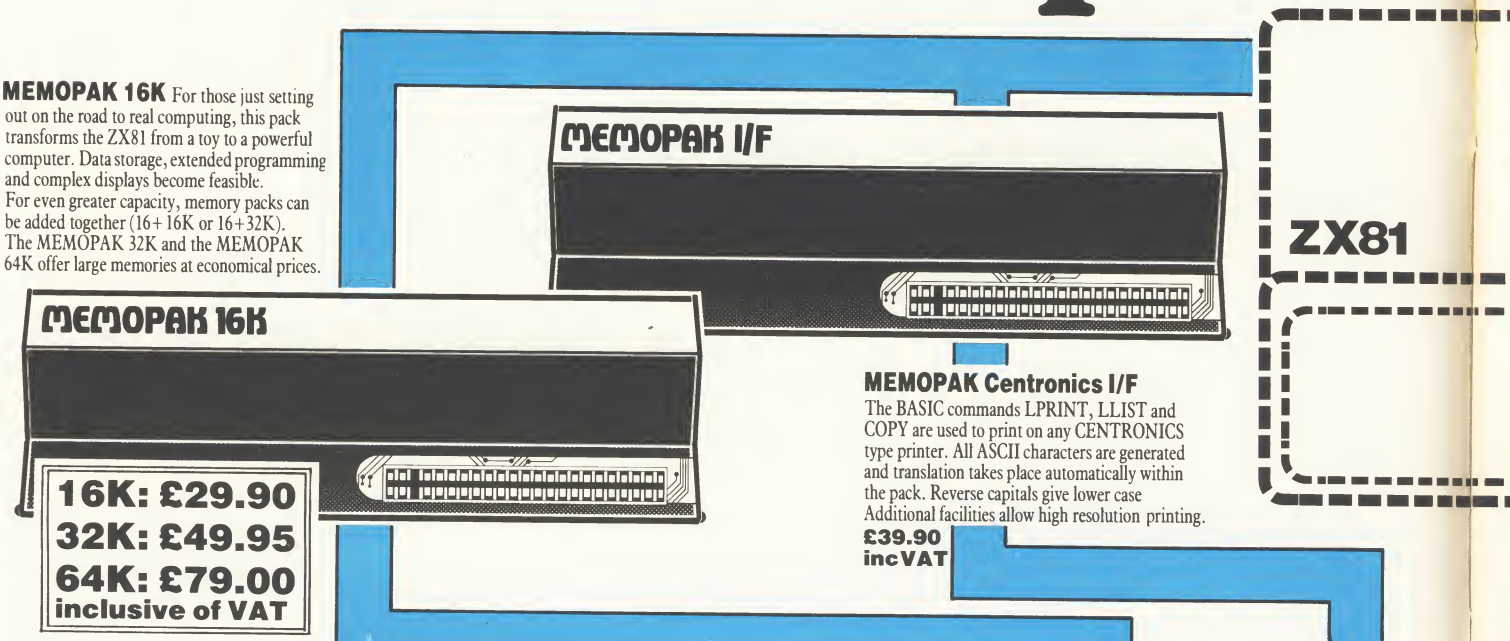
Address _____

_____ SU6

_____ FILESIXTY

At Mem
we realise the poten

MEMOPAK 16K For those just setting out on the road to real computing, this pack transforms the ZX81 from a toy to a powerful computer. Data storage, extended programming and complex displays become feasible.
For even greater capacity, memory packs can be added together (16+16K or 16+32K). The MEMOPAK 32K and the MEMOPAK 64K offer large memories at economical prices.



MEMOPAK Centronics I/F
The BASIC commands LPRINT, LLIST and COPY are used to print on any CENTRONICS type printer. All ASCII characters are generated and translation takes place automatically within the pack. Reverse capitals give lower case Additional facilities allow high resolution printing.
£39.90 incVAT

It all adds up to an efficient, modular computer system

The **Memotech** approach to microcomputing is to take the well-proven and popular ZX81 as the heart of a modular system. This small computer houses the powerful Z80A processing unit and acts as the central processor module through which the **Memopaks** operate.

Memotech has a reputation for professional quality, producing units which are designed to fit perfectly, to look well-balanced, and to work efficiently and reliably.

The modular approach gives ZX81 owners the freedom to design the system they really need. Furthermore, the intercompatibility of the modules ensures that later additions will click straight in, to give you a system that grows with your ambitions and abilities.

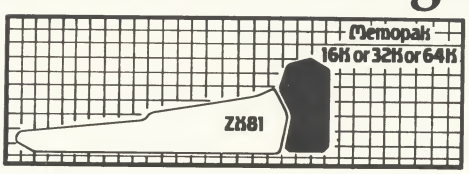
To ensure that your expectations are realised, care is taken at every stage to design features into the system to anticipate your needs. For example:
1) Memories are cumulative e.g. 16K and 32K can be added to the **Memopak 16K** or even to the Sinclair 16K RAM pack. 2) The **HRG** firmware allows commonly used constructions (such as scrolling, shading and labelling graphs), to be called by a few simple commands. 3) The **Centronics I/F** converts ZX81 character codes into ASCII and extends the print line to the width of the printer, still using the LLIST, LPRINT and COPY commands.

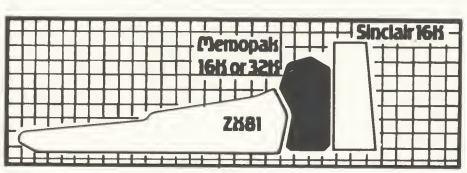
As one example, a system with 16K of memory and **Memocalc** is all that is required to perform the same sophisticated numerical projections as a computer at 10 times the price. The problem may be as complicated as a cash flow or production schedule, or as simple as household accounts or pocket money budgeting. If your bank manager wants to see a cash flow, then a single print instruction to the **Centronics I/F** will give a printout which is more than acceptable.

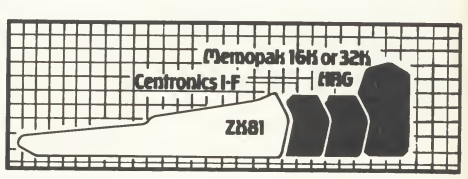
The example system which is shown, on the other hand, would satisfy the needs of someone who wanted to enter data

How it all fits together

You can see from the diagrams how various Memotech/Sinclair units can be combined.



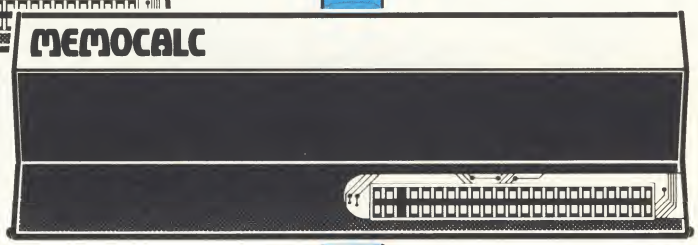




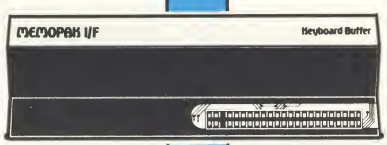
otech,
tial of your ZX81...

MEMOPAK HRG This pack breaks down the constraints imposed by operating at the ZX81 character level and allows high definition displays to be generated. All 248 × 192 individual pixels can be controlled using simple commands, and the built in software enables the user to work interactively at the dot, line, character, block and page levels. Scrolling, flashing and animation are all here.
£39.90 inc VAT

MEMOCALC The screen display behaves as a 'window' on a large sheet of paper on which a table of numbers is laid out. The maximum size of the table is determined by the memory capacity, and with a MEMOPAK 64K a table of up to 7000 numbers with up to 250 rows or 99 columns can be specified. Each location in the table can be either a number which is keyed in or a formula which generates a number.
£29.90 inc VAT



MEMOTECH KEYBOARD
The Memotech plug-in Keyboard plus buffer pack takes the effort out of data entry for ZX81 users. The Keyboard has a light professional touch and is housed in an elegant aluminium case. The simple plug-in system means that you are not obliged to open up your ZX81, use a soldering iron or invalidate your ZX81 warranty.
£49.95 inc VAT



KEYBOARD BUFFER PAK
The Buffer Pak performs a "housekeeping" function for the Keyboard, interfacing directly with the port at the back of your ZX81.

via a light-touch keyboard, construct and label graphs, and then copy the screen to an 80-column printer. Only 16K of memory is shown here but with additional memory, more than one video page can be stored. Up to 7 pages can be displayed in rapid succession to give animated displays.

Looking forward, **Memotech** will continue to back the ZX81 through 1983 with fast storage devices, pressure sensitive electronic drawing boards and more software packs including a **Wordprocessor,** an **RS232 Interface** and a **Z80 Assembler.**

Memotech products are available from major branches of **W.H. Smith & John Menzies**

To: Memotech Limited, Witney, Oxon, OX8 6BX
Tel: Witney 2977, Telex 83372 Memtec G
Please send me the following Memotech products:

Please add £2.00 per item to cover post and packing

I enclose a cheque/P.O. for _____
or please debit my Access/Barclaycard account number

Signature _____ Date _____

Name and Address _____

ZX81

High Resolution Graphics £32

* Stylish case fits neatly between ZX81 and Ram pack of 8K or more.
* 256 x 192 pixels.
* Hi res display file independent of old display file.
* Very fast and powerful graphics commands as extensions of Sinclair basic: SLOW / FAST CLS COPY PRINT PLOT all extended to hi res.
* **114 PLOT modes including:**

  Points and various line types
  Textured triangle fill
  Absolute and relative co-ordinates
  Line drawing to points off screen

* **Mixed text and graphics including PRINT at graphics cursor.**
* **User defined graphics for space invaders etc**
* **Screen COPY to printer**
* Extensive manual, excellent for school and home use, and full guarantee.
* Arcade games available soon!

Post to:– Notting Dale Technology Centre (Ltd)
T.F.L. (ZX 81)
189 Freston Road
London W10 6TH (01-969 8942)

Please send me ..... board(s) @ £32.00 each
+ £4.80 VAT plus 75p P&P

I enclose Cheque/P.O. for .....
Or I wish to pay by Access

Card Number .....

Name and Address (PRINT)

Name .....

Address .....

.....

Credit card holder's signature.

JOIN THE USERS' CLUB

FREE BOOK!

Make the most of your Spectrum or ZX81 by joining the country's strongest and most enthusiastic users' club–the National ZX Users' Club.

When you join us, we'll send you our 'new members welcome pack' with *30* programs (15 for the ZX81, 15 for the Spectrum), plus the first issue of our value-packed club magazine INTERFACE.

Inside INTERFACE as well as at least six programs for your ZX81 or Spectrum, you'll find letters from members as they share tips and ideas, and sound off on a variety of subjects (such as you-know-who's appalling delivery times record), a list of local ZX clubs, and special offers from software houses and book publishers–special offers just for members.
If you're having problems with your computer, we have experts on tap to try and help you. If you want to start a local users' club, we'll give you publicity, and let you buy books at a special discount for your club members.
If you're not a club member, you're missing out on making the most of your micro (and try saying that ten times quickly!)
Come on in and join us, the water's fine. It's £9.50 for a year's INTERFACE, and we'll send you a sample issue for £1.00

Run by Tim Hartnell, the National ZX Users' Club is a resource just waiting to be tapped. Come on and start tapping.

National ZX Users' Club,
Dept. *SU*
44-46 Earls Court Road,
London, W8 6EJ

OK, Tim, you've convinced me:

( ) Send me my 'new members' welcome pack' plus my first issue of INTERFACE and keep those INTERFACES coming for the next year. I enclose £9.50 (UK), £12.50 (Europe)

( ) Just send me a sample of INTERFACE. I enclose £1.00

I have ( ) a ZX81 ( ) a Spectrum

Name .....

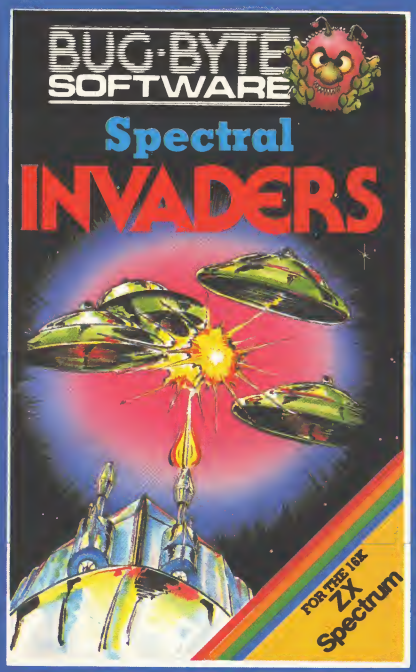
Address .....

.....

Sinclair programs delivered!

BEST SELLER

FOR THE ZX SPECTRUM

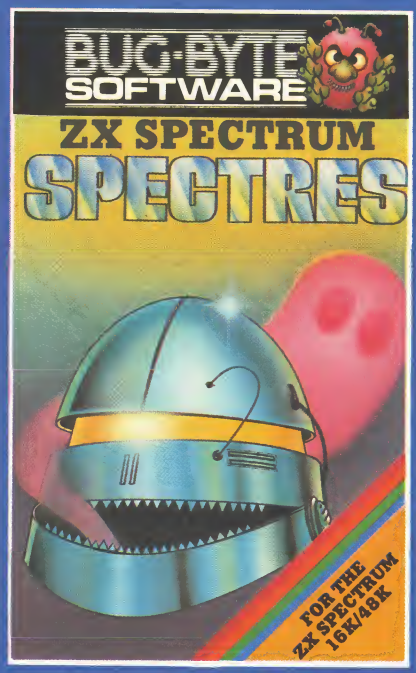


FOR THE ZX SPECTRUM

PRICE £5

BEST SELLER

FOR THE ZX SPECTRUM



FOR THE ZX SPECTRUM

PRICE £8

NEW IMPROVED VERSION

FOR THE ZX SPECTRUM

FOR THE ZX SPECTRUM

PRICE £9

★BRAND NEW PROGRAM★

FOR THE ZX SPECTRUM

FOR THE ZX SPECTRUM

PRICE £8

SOFTWARE EXPRESS

SOFTWARE EXPRESS, FREEPOST (No Stamp Required), Liverpool L33 3AB
Software Express is a trading name of DAMS Office Equipment Limited.

THE SOFTWARE EXPRESS EASY-REPLY COUPON

Please mail me the following Software Cassettes.
(All prices include VAT and postage).

PROGRAM	PRICE	INSERT QUANTITY
FOR THE ZX SPECTRUM		
SPECTRAL INVADERS	£5	
SPECTRES	£8	
ASPECT	£9	
THE CASTLE	£8	
FOR THE 16K ZX81		
MAZOGS	£10	
DICTATOR	£9	
INVADERS	£4	
ZXAS (Z80 Assembler)	£5	
ZXDB (Z80 Debugger)	£6.50	
ZXTK (Z80 Toolkit)	£6	

TOTAL PRICE £

I enclose cheque/P.O. ☐
Payable to Software Express.
Or please charge my Access/ Barclaycard No.

24 HOUR ANSAPHONE FOR CREDIT CARD ORDERS:

051-548 2020

Name: _____

Address: _____

_____

_____ Tel: _____

Mail to:
SOFTWARE EXPRESS
FREEPOST
(No Stamp Required)
Liverpool L33 3AB

S.U.5

Tower of Babel hits Sinclair

As more users become accustomed to Sinclair Basic and its limitations they have turned to other languages to help solve particular problems. John Gilbert investigates the growing demand for new ways of conversing with your machine, such as Forth, Pascal, Logo and Lisp.

BASIC, as used on the ZX-81 and Spectrum, is a high-level language. That means that it is easily understood by human operators but that the computer has to translate any entry made by a user into the code which it understands.

Basic was designed to help people become accustomed to a computer and was not written to perform any particular task. That is the problem with it when compared to other languages. Languages such as Forth and Fortran were written to perform specific tasks.

Forth has already been implemented on the ZX-81 and some versions are available for the 48K Spectrum. The language was designed originally for engineers who needed to process formulae. It runs at many times the speed of Basic and, with graphics added to the list of commands available, you can play a good game of space invaders by using it.

The most interesting aspect of Forth is that you can define your own commands using words which already exist as part of the standard system. A dictionary of those words usually is accessible on the system using a list command. For instance, if you want to find the square of a number you would use the standard word DUP. If you want to find the square of a number squared again you could define your own word, for instance DUPD, by defining it as DUP*DUP. All that seems very complicated if you are used to Basic.

Some languages require even more discipline on the part of the programmer.

Pascal, for instance, is a language which requires the programmer to define all variables and functions used throughout the program in the first section of the code. A program written in Pascal must then be structured as a series of routines, each routine being relatively independent of the others.

The language is slightly more difficult to use than Basic as it forces the programmer to think about how the code is to be put into the computer, which operations are to be performed first, and where routines are to be placed in a program, instead of deciding what code you need for a specific job.

"Hmm . . . it's not so much BASIC as EARTHY."

Children and schoolteachers are becoming interested in a language called Logo, which has been imported from the U.S. Its inventor is Seymour Papert and embodied in it are several controversial concepts which many educationalists are beginning to question.

The emphasis of the language lays with teaching children about mathematics through graphics shapes on the screen and through the use of a robot, called a turtle, which can be controlled from a computer. The robot can be used to draw shapes on the floor and puts into practice the concept of learning by experience.

Educationalists in Britain are sceptical about using turtles in that way. The reason is that learning in British schools has been, and still is, by the repetitive rote learning method.

Some schools are experimenting with turtles but the lessons taught using them have been structured so that children are still learning by rote and not by experiment or experience.

At present, Sinclair Research is designing a version of Logo to work on the Spectrum. Edinburgh University is also working hard to produce a floor turtle for the machine. The language will be supplied free to schools which choose the Spectrum under the Government Microcomputers in Schools scheme.

The artificial intelligence language Lisp has already been released for the Spectrum by Serious Software. Lisp is used for list processing and programs can be written which will act like intelligent databases.

Serious Software has provided a database written using the Lisp package. It includes the names of a family group with relations which they form to each other. Using the program you can discover which members of the family have children, which have brothers, and whether those brothers are married. The database seems intelligent because you can ask it questions which are limited only by your imagination.

Normal databases would allow information to be accessed only using such techniques as entering a keyword to

find data. You can also use Lisp to write programs which will seem to give meaningful answers to entries you type into the computer. The computer will select an answer depending on the data which is stored in its memory and how it has answered questions similar to the current one.

Programs which simulate this type of intelligent computer response have been written in Basic. One such program, Eliza, acts like a human psychiatrist and many of the replies it generates seem almost too much like human response.

The Eliza program in Basic is amusing but with large amounts of data in memory the program will respond very slowly, sometimes taking two minutes to analyse entries. Lisp was devised for that kind of work and so it has the advantage of speed over Basic in this area.

Most computer languages were designed with a purpose. Unfortunately, languages like Basic have been corrupted and are now used for different purposes from those which their designers had intended.

Basic was not intended as a commercially-used programming language for the design of space invader games. Unfortunately, programmers can use only the langauge available to them and on the Spectrum that is either Basic or machine code.

Sinclair is now making it possible to use other languages but Basic is still the most popular, not because people like it better than other languages but because very few people have had the opportunity to use any of the others.

Only one small microcomputer has been produced which will run a language other than Basic, the Jupiter Ace. Sinclair is definitely an innovator in the market, so perhaps a micro with a new dedicated business language may be the next step — and perhaps the idea behind a ZX-83.

FORTH

Artic Computing, 396 James Reckitt Avenue, Hull, North Humberside. (48K Spectrum/ZX-81).

Abersoft, 7 Maes Afallen, Bow Street, Dyfed SY24 5BA. (Spectrum 48K).

PASCAL

Interface, Dept. SU, 44–46 Earls Court Road, London W8 6EJ. (Book with Basic compiler).

LOGO

Sinclair Research, Freepost, Camberley, Surrey GU15 3BR. (Spectrum — to be released).

LISP

Serious Software, 7 Woodside Road, Bickley, Kent BR1 2ES. (Spectrum 48K).

Illustration by Stuart Briers

OUT OF THIS WORLD SOFTWARE...

PLEASE SEND ME ..... @ £ .....

PLEASE SEND ME ..... @ £ .....

PLEASE SEND ME ..... @ £ .....

PLEASE ADD ON 50P FOR P/P

I ENCLOSE CHEQUE/P.O. PAYABLE TO dk tronics

TOTAL ..... OR DEBIT MY ACCESS/BARCLAYCARD

NAME .....

ADDRESS .....

.....

SIGNATURE .....

3D TANX £4.95 This a totally new and unique game, never before have such graphics been seen on the Spectrum. Pit your wits against the enemy Tanx. This is a full feature game with fantastic 3D balistics. We believe that this game has no equal. Fantastic sounds and colour.

CENTIPEDE £4.95 One of the most addictive games for the Spectrum. The centipede increases in length as the spider becomes an increasing menance. As you shoot off the segments, the centipede spilts up and moves at accelerated speed up, down, left, right. Full sound effects and colour.

DICTATOR £4.95 Will you be able to manipulate the squabbling population, stay in favour with the powerful secret policy and make the right decisions to keep control of your volatile subjects? A complex and entertaining simulation adventure featuring easy operation and excellent use of graphics, colour, and sound effects.

ZXED (TOOLKIT) £6.95 Zxed is a powerful editor for use on the 16K or 48K Spectrum, intended for use by the serious basic programmer, and offers several useful and time-saving features. Features provided are as follows: ALTER, BYTES, COPY, DELETE, FIND, HELP, LINE, MOVE, RENUMBER, AUTOLINE, RENUMBERER, and VERIFY. These will help you during all stages of program development.

3D SPAWN OF EVIL £4.95 Deep into the galactic void, hosts of alien spawn go through a complex multi-stage breeding cycle. Your task is to seek out and smash the cycle to eliminate the spawn before it matures to full attack potential. This is the most spectacular 3D space game ever written for this 16K Spectrum.

METEOROIDS £4.95 The best Spectrum version of this popular arcade game. Three meteor types which increase and decrease in frequency. The meteros shatter into many fragments and the fragments even splatter. Ship drift and decelerate, space walk, and evil alien ship. This game also contains two character sets.

SOUND FX £4.95 Released by popular demand, this is the program that was used to create most of the sound effects featured in our game. It enables you to create an infinitely variable amount of machine code sounds, and use them in your own basic programs. Even the beginner can use this program to create fantastic sounds for his own programs.

DISASSEMBLER £4.95 This is a fast machine code disassembler for use on the 48K and 16K Spectrum. It gives full colour output to the screen, grouping together similar instructions in the same colour, IE: all loading instructions are green. You have options for output into the screen or printer, this output be in decimal or hex.

FRUIT MACHINE £4.95 An excellent new program from d'k tronics, with such features as: nudge, hold, gamble. Superb use of graphics and colour; just like the real thing, and just as addictive!

FROM

d'k tronics

CREDIT CARD SALES LINE (0799) 22359/26350 (24 hrs).

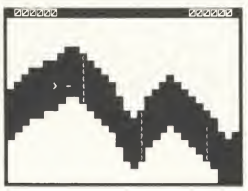
QUOTING YOUR ACCESS OR BARCLAYCARD NUMBER d'k tronics, Unit 2, Shire hill Ind. Est., Saffron Walden, Essex. CB11 3AQ.

d'k tronics Software is also available from Boots, WH Smiths and all good Software outlets.

A TOTALLY NEW AND ORIGINAL GAME
FROM SOFTWARE FARM
FOR 16K ZX81

NEW!

the Super Scramble



YOUR MISSION

To penetrate the Witches Defences, Enter her Cavern and Destroy her wicked Heart

THE WITCHES DEFENCES

STALAGMITES AND STALACTITES which grow across your path. Blast a way through with your Lazer Cannon (but beware – a surprise is in store fore you!).
VOLCANOES to get past alive – if you can! – an ever increasing amount of white-hot Larva to avoid the closer you get to the witches cavern.
VAMPIRE BATS that cling to your ship, making your controls sluggish and finally (if you are not careful) dragging you down to your destruction.
CAVE-INS should you hit the side of the cave with your Lazer Cannon or Bomb, part of the roof will cave-in on you – the greater the landslides to avoid each time!.
THE NEARER you get to the Witches Cavern, the more of her Defences she will throw at you at once. Should you survive all of them (highly unlikely) then you must contend with the Witch herself! Avoid being turned to stone by her spells while attempting to destroy her wicked Heart!.

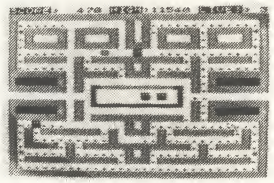
* Written entirely in Machine Code
* Hall of Fame
* 1 or 2 Players
* Mystery Score positions to bomb
* 5 Skill Levels

DESTINED TO BECOME A CLASSIC!

AND ONLY £5.95

THE SOFTWARE FARM Dept. SU
CRAIGO FARM, BOTANY BAY, TINTERN, GWENT

SPECTRUM 16/48K – ZX81 16K

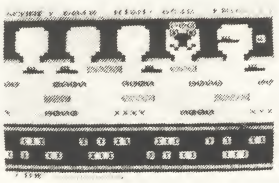


ZUCKMAN ZX81 (16K)

EAT THE DOTS, BEAT THE GHOSTS IN THIS ADDICTIVE GAME. CLEAR THE SCREEN OF DOTS TO EARN A BONUS LIFE AND A FRESH MAZE-FULL OF DOTS. WHEN THE CHASE REVERSES, CATCH A GHOST AND SEE ITS 'EYES' RETURN TO BOX.

* ALL MACHINE CODE (10K)
* AUTHENTIC ARCADE ACTION
* HIGH-SCORE 'HALL OF FAME'
* TITLE/DISPLAY ATTRACT MODE

ONLY £5.95 INC P&P



FROGGER ZX81 (16K)

GUIDE YOUR FROG ACROSS THE ROAD, THEN CROSS THE RIVER BY JUMPING ONTO TURTLES AND LOGS, TO REACH SAFETY IN A FROG-HOME. FILL ALL FIVE FROG-HOMES TO EARN A NEW 'SCREEN' WITH MORE HAZARDS.

* MOVING CARS, LOGS, TURTLES
* ALLIGATORS, DIVING TURTLES
* SAVE BABY FROG FOR BONUS
* ALL MACHINE CODE (13.5K)

ONLY £5.95 INC P&P

SPECTRUM 16/48K VERSIONS AVAILABLE SAME PRICE
(NB: Photographs show ZX81 versions)

DJL SOFTWARE

9 TWEED CLOSE, SWINDON, WILTS SN2 3PU
TRADE ENQUIRIES WELCOME

HEWSON CONSULTANTS

bring you **HEATHROW**

For the 16 or 48K ZX spectrum

Air Traffic Control

£7.95

YOUR TASK: to direct incoming aircraft from holding stacks to runway – smoothly, safely and expeditiously.

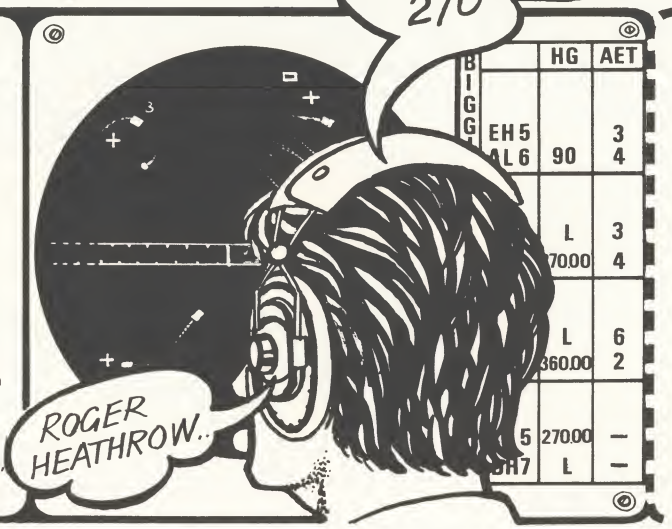
YOUR INSTRUMENTS: Radar screen showing aircraft call signs, blips and trails. Four stack displays giving altitude, heading, speed and size.

SEVEN levels of play including a demonstration mode.

Choose an EASY mode to begin with – landing light aircraft any way you can.

Progress to more TRICKY situations – mixed aircraft, restricted airspace, minimum separation, outbound traffic.

The ULTIMATE CHALLENGE – emergencies, unknown aircraft, radio failure, loss of a runway, instrument failure . . .

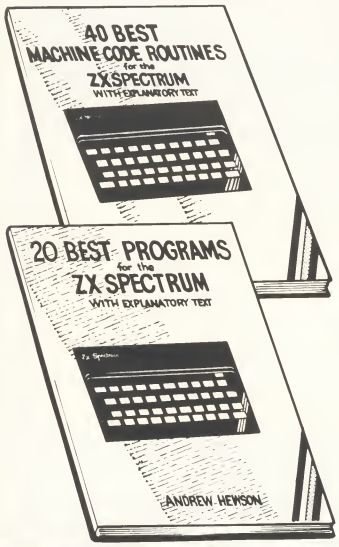


Please rush me . . . . . .copy/copies of HEATHROW A.T.C.
I enclose remittance of . . . . . (cheques/PO's payable to Hewson Consultants).
Please debit my Access/Barclay account number . . . . . .
Signed . . . . . .
Name (block capitals) . . . . . .
. . . . . .
Address . . . . . .
. . . . . .
. . . . . .
Postcode . . . . . .
Send today to: Hewson Consultants, 60a, St. Mary's Street, Wallingford, Oxon. OX10 0EL.

Hewson Consultants

We proudly announce our 1983 range of

SPECTRUM SOFTWARE



40 BEST MACHINE CODE ROUTINES FOR THE ZX SPECTRUM £5.95

By Andrew Hewson and John Hardman

Section A: Three chapters explaining what you need to know about Z80 machine code on the Spectrum.

- How to load and save machine code.
- How to use the system variables.
- How program lines are stored.
- How to use the stack, the display, the attribute files.

Section B: 40 routines including,

- Scroll – up, down, side to side by pixel or by character.
- Search and replace, token swap, string search.
- Rotate character, invert character – horizontally and vertically.
- Line renumber – including GOSUBs, GOTOs, RUN etc.

20 BEST PROGRAMS FOR THE ZX SPECTRUM £5.95

By Andrew Hewson

Program titles include:

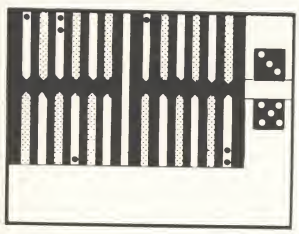
Machine Code Editor – Write, modify, extend and load machine code using this all-basic program. No need to use an Assembler when you have this program.

Index File – Learn about fixed length records, save numeric and string information, add to, sort, modify, delete and print your records. Ideal as a computer based filing system.

Duckshoot – Learn how to manipulate the attributes file *and* have fun at the same time.

Graphix – Construct up to 210 graphics characters with the full on-screen editing facilities, enhance and modify them and recall them later to build a detailed display to save on cassette.

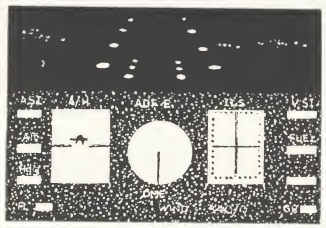
Plus: FOOTBALL, DIGITISER, DIARY and many more.



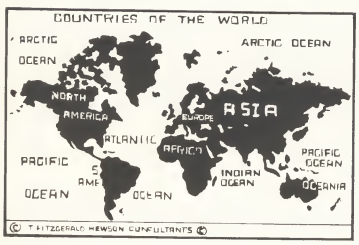
BACKGAMMON 16K £5.95

8 Levels of play from novice to expert.
Full colour display of tables and dice.
Gamble on a single game or a series, double or quits. All the features of the ancient game.

NIGHTFLITE 16 and 48K £5.95



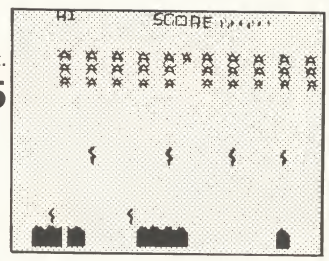
NIGHTFLITE puts you at the controls of a light aircraft flying at night. You can:
Climb, descend, take off,
Land, bank left or right,
Navigate between beacons,
Raise/lower the flaps,
Raise/lower the undercarriage,
Adjust engine rpm,
Raise/lower the nose varying amounts.
Runway lights appear on approach.
5 modes including Autopilot.
Written by a qualified light aircraft pilot.



COUNTRIES OF THE WORLD £5.95

16 and 48K on one cassette
Countries of the World is an educational package designed to give an appreciation of the location of all the main countries and some information about them.
16K version displays a world map, shows the position of each country and names its capital.
48K version; all the above plus prints the population, size, currency, and main languages of each country, and statistics on largest and smallest countries etc.

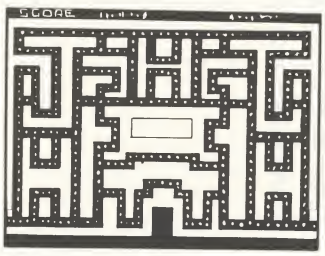
PLUS: Two complete world map screen displays for you to include in your own programs.



SPECVADERS £4.95

16K

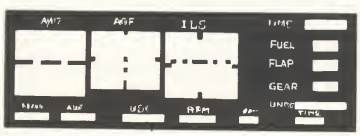
Defeat each squadron of Beeple Zaps and another appears only closer.
Cyrian mothership with ejecting Zeetle Baps.
5 levels of play from Orions snails pace to close your eyes and hope.
Real time scoring. 3 lives. Pan galactic gargle blaster for highest score.
Descending asteriods.



MAZE CHASE £ 4.95

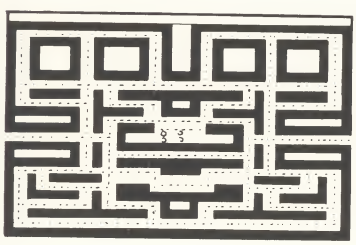
16 and 48K

4 or 8 Mazes, Highest score to date,
4 independent guardians, 3 lives,
Full colour, Fast machine code action,
magic strawberries, eat lemons to score more, real time scoring.



PILOT 16K (ZX81) £5.95

Fly your own aircraft.
Instruments and readouts:
A/H, ALT, HDG, FL, GR, VOR, VSI, WIND, DME, ADF, and ILS
see "NIGHTFLITE". Essentially the same as "NIGHTFLITE" but without the Hi Res Graphics.



PUCKMAN 16K (ZX81) £5.95

3 Mazes.
Highest score to date.
4 Independent guardians.
Magic strawberries.
Real time scoring.

ORDER FORM

Make cheques/PO's payable to Hewson Consultants

Quantity	Product	Cost

Name _____ Total _____
(Block Capitals Please)

Address _____ Signed _____

My Access/Barclaycard No. is _____

Post to: **HEWSON CONSULTANTS**, 60A St Mary's Street, Wallingford, Oxon OX10 0EL.
Tel (0491) 36307.

KAYDE

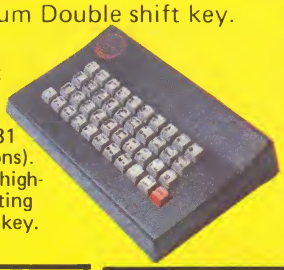
KEYBOARDS – For the ZX81 and Spectrum.

Features include
ZX81 Repeat key and Spectrum Double shift key.

All keyboards are 'electric typewriter' quality, full size and are fully built and tested. They allow you to use all other add-ons. No extra power is needed. Fully guaranteed.

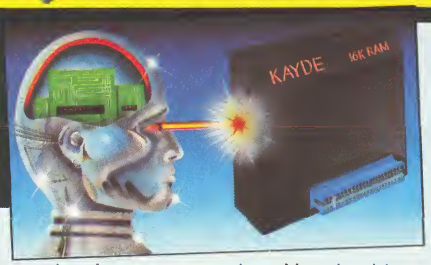
A fitting service is available for all our keyboards and costs £4.00 including postage and packing. Send for details.

Kayde Standard Keyboard
This is used for both computers, but does not accomodate them inside the casing. Open your computer and plug in the connector. (The ZX81 requires two simple solder connections). The keyboard comes complete with high-impact black plastic case and full fitting instructions. The ZX81 has a repeat key. **£37.95**



Kayde Super Plug-in Keyboard
This is the ultimate keyboard for your Sinclair computer, you simply plug it into the user port at the back. No disassembling. Complete with full-size space bar and ZX81 repeat key. **£49.95**

Kayde Deluxe Keyboard
This keyboard is also used for both types of computer but allows you to fit your computer inside. It also has a full size space bar and a ZX81 repeat key. The Spectrum version needs no soldering, the ZX81 two simple solder connections.
£45.00



RAM Packs
All Kayde RAM Packs use state of the art technology and feature top-quality, low power memories. Housed in high-impact polysterene, they look good and are fully tested and guaranteed.

Kayde ZX81 64K RAM Pack
Totally the same design as our 16K but giving you a massive 64K turning your machine into a very powerful computer **£59.95**

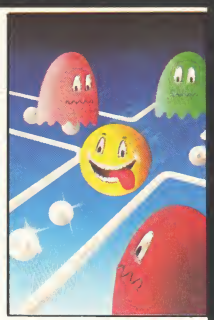
Kayde ZX81 16K RAM Pack
Low power feature allows you to use all other add-ons including ZX81 printer without wobble, overheating or memory loss. You should only have to buy one RAM Pack for your ZX81 so buy the best at the beginning and save yourself unnecessary problems.
£29.95

Kayde Spectrum 32K RAM Pack (Issue II)
This brings your Spectrum up to a full 48K. It is easily fitted, and comes as a kit with RAM chips that slot into existing connectors. No soldering necessary. **£35.95**

NEW! **Kayde Spectrum 32K Plug-in RAM Pack**
The same design as our 32K RAM pack kit, but simply plugs in the back of your Spectrum. No need to open your machine. **£44.95**

Kayde 4K Graphics ROM Pack
This comes complete with a pre-programmed 4K Graphics ROM to give you an extra 450 graphics. The board has facilities for either 2K of RAM (for user definable graphics, 4K of RAM or our 4K Tool Kit. The entire board fits neatly inside your computer.
A free fitting service is available on request.

4K Graphics Board	£29.95
4K Tool Kit	£9.95
2K UDG ROM and Character Generator Cassette	£10.95
16K Graphic Software Peckman*	£5.95



* Can only be used with 4K Graphics Board.

Kayde Spectrum Sound Module
This module fits neatly inside your Spectrum and lets the sound come through the more powerful speaker on your television rather than the Spectrum. No soldering required. **£9.95**

Newsflash!! **Kayde Software**
The Valley
Available for 16K VIC 20, Dragon 32, New Brain and Oric
This is an exciting real time adventure. You can be a wizard, thinker, barbarian, warrior or cleric depending on your mood. Each character has its own strengths and weaknesses. You fight fearsome monsters, meet exciting challenges, solve mind-bending riddles in the most involving adventure game yet. **£9.95**

Kayde Keys (VIC 20) This program runs on just 300 bytes and gives you the use of function keys and characters on a VIC 20, there are over 25 commands at your disposal. **£6.95**

Design/Restore (VIC 20)
A complete system to enable you to create your own characters. Also includes restore program to load characters into your VIC. Three character sets included. **£9.99**

SOFTWARE WRITERS WANTED
If you want the best deal for your original programs then send a copy to us for review. We offer highest royalties, security and marketing. Don't forget to include a description of the program and for what machine it is intended.

Mail Order Lists
For full mail order lists write to the address below.

We offer the fastest delivery time of all times.

Mail Order + Showroom
Kayde Electronic Systems Ltd.,
The Conge Great Yarmouth
Norfolk NR30 1PJ Tel:(0493) 55253/57867

New London Showroom
Kayde Home Computers Ltd
1 Station Approach
New Eltham London SE9 Tel: 01-859 7505

Dealer Enquiries to:–
Zone Distribution Ltd.
13 Old Court Long Melford
Sudbury Suffolk Tel:(0787)312234

ALL MAIL ORDERS
TO: KAYDE ELECTRONIC SYSTEMS LTD, DEPT.WM2, THE CONGE, GREAT YARMOUTH, NORFOLK NR30 1PJ

PLEASE PRINT AND STATE TYPE OF COMPUTER

Qty	Item	Item Price £	Total £

Please allow £2.00 P&P for all Hardware 50p for all software

DON'T FORGET YOU CAN ALWAYS ORDER ON THE TELEPHONE WITH YOUR CREDIT CARD. DEALERS WELCOME. SU 5

*I enclose a cheque/postal order payable to ***KAYDE Electronic Systems Ltd,*** for £.....

*Please charge to my Access/Barclaycard/Trustcard account no.

*Please delete/complete as applicable

Signature

Name: Mr/Mrs/Miss

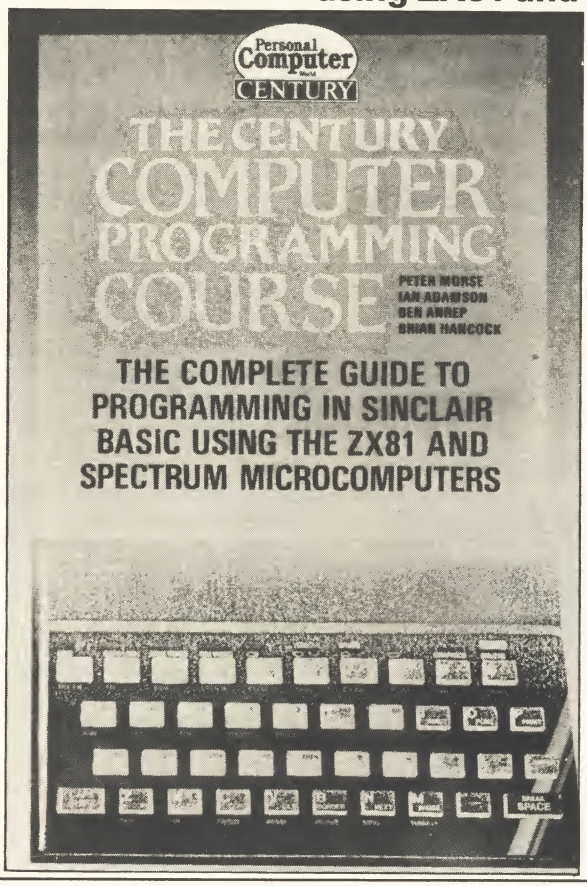
Address

Personal Computer World
CENTURY

THE CENTURY COMPUTER PROGRAMMING COURSE

PETER MORSE
IAN ADAMSON
BEN ANREP
BRIAN HANCOCK

The complete guide to programming in Sinclair BASIC using ZX81 and Spectrum Microcomputers



Sinclair have sold over 600,000 ZX81's and Spectrums, which means that somewhere out there are 600,000+ potential programmers.

There are enough books and collections of programs on the market to help you get beyond the user manual. **The Century Computer Programming Course** aims to transform any Sinclair owner into a serious **programmer** – whether they own a Spectrum or a ZX81, whether they are totally new to computing or simply have ideas in advance of their current expertise.

Beginning with the elements of BASIC syntax, **The Century Computer Programming Course** takes you right through to the creation of sophisticated applications programs. More than 500 pages and 200 programs and routines makes this a monumental project. Without it Sinclair owners are likely to remain games players for the rest of their computing lives...

Illustrated with line drawings 544pp
£9.95 (paperback)
Available through your local bookshop

To: Department CC4
George Philip Services Ltd
Arndale Road, Wick
Littlehampton
West Sussex BN17 7EN

Please send me ..... copy/copies of THE CENTURY COMPUTER PROGRAMMING COURSE at £11.50 per copy (post paid). (£13.50 post paid for overseas addresses)

I enclose my cheque/postal order for £.....
(Please make your cheque/postal order payable to George Philip)
Name .....
Address .....
.....
.....
Please allow up to 28 days for delivery

CENTURY

Innovation is the route to success

Clive Sinclair gave his views to the London Business School on how to start a business even when the times do not appear perfect

THE CLIVE SINCLAIR secret of business success is innovation. He said so during a recent talk at the London Business School.

The large multi-nationals, he said, are already involved in almost every field and it is necessary for a new venture to innovate. That may be through inventing a new product; finding a new method of marketing — as an example, 20 years ago Sinclair Radionics began selling electronic equipment by mail order, until which time it had been done by shops; the innovation may be in management techniques applied by the company, or it may be in the application of new levels of efficiency — either in cost of production or in profit on sales. To succeed, the new entrepreneur must think of what the future looks like and decide which direction to go.

Sinclair thought that the rate at which the world is changing has been relatively smooth for many years but that rate of change is becoming increasingly rapid. In particular, patterns of employment are changing. Traditionally the pattern of employment of large companies has been a gradual increase in the number of employees.

That approach is no longer viable. The time that it takes to co-ordinate huge numbers of employees ensures that large companies are always technologically behind smaller, more flexible companies and therefore less efficient. Large companies are now shedding employees. The rate at which they are shedding is increasing and it is an irreversible trend. The pattern will not change with the ending of the world recession.

Employment is based increasingly on a small team of specialists getting together, to work for a limited time on a specific project. A television producer, for instance, will sub-contract to various specialists — camera operators, script writers and the like. Those specialists work on a self-employed basis. It gives the employer more flexibility in the design and marketing of new products. That method of production provides an advantage to small new companies.

> 'New entrepreneurs must think of what the future looks like and decide what direction to go'

There is also rapid change in the way things are sold. Sales are aimed increasingly at world rather than home markets. Vast production runs for worldwide markets enable a company selling internationally to sell much more cheaply than could a local producer. That trend to world markets is irreversible unless the major economic powers set up trade and tariff barriers.

Sinclair added that the time is right to start a new business. Many economic observers think that the world has bottomed-out of its slump and that we are returning slowly to boom times. Even if one takes the opposite view there are good reasons for those with new ideas to start businesses now.

The Russian economist N D Kondratieff suggested that trade and production follows 50-year cycles. The first 20 years are a period of new inventions. During that time society struggles to produce the new inventions in sufficient quantities to meet the demand for them. That is a boom period. After that there is much lower demand, covering replacement as the goods wear out. Firms producing the new products go into fierce competition. There is a slump period, which lasts until another period of invention begins.

In the last 20 years there has been a surge of invention and technological change so this could be a good time to start a new business. The new areas such as bio-technology and computers will thrive. The newest inventions in those areas have been 10 to 15 years in

development before they reach mass markets. There are opportunities in those areas for new ventures.

A depression is a good time to start, even in those areas which have already been developed. Suppliers to those industries have become highly competitive. They use massive economies of scale and small profit margins. They are always looking for new customers.

An entrepreneur who can provide new custom will be supported by those suppliers — e.g., Sinclair has increased the output of Timex and has taken full advantage of Timex economies of scale in electronic manufacturing. During a depression, the new venture enjoys similar benefits from retailers. The retailers' sales of traditional products are declining and he is looking for new products to attract more customers.

In the next few years certain industries are set to boom. Among them are health, education, leisure, bio-technology and electronics. Transport, too, is due for a boom. That may seem surprising but the basic form of the motor car has not changed since the beginning of the century. There have been tremendous refinements but the form of internal combustion engine mounted on a steerable carriage has not changed. Whoever detects the next form will be a winner.

Two industries particularly stand out as potential growth areas — power generation and leisure travel. There is an enormous range of new ways of generating power which have been developed recently. For the most part we still rely on methods of generating power invented in the 19th century. The introduction of computers and automated manufacture will result in increased leisure travel, in the same way that the first industrial revolution led to greater leisure travel.

Sinclair also had advice on where the budding entrepreneur should seek backing. There are several Government schemes to finance new products but the greatest Government boons to new enterprises are the various tax exemption schemes.

> 'A depression is a good time to start even in those areas which have already been developed'

Start-up capital can be exempt from taxation for up to three years. A company with a new product may start a separate company to launch the new product. The new company will be exempt from tax on capital for another three years. A very attractive aspect of that scheme is that it can be retroactive, allowing the new venture to save the money it pays in taxes, which may then be invested for further development.

Venture capital is a relatively new form of funding new businesses. It is an idea which has been operating in the U.S. for some time and is starting to become increasingly important in the U.K. Venture capital companies differ from the more traditional lenders, such as the banks, in that they offer help to the new venture in many ways. They will often provide experienced accountants and advice on management. That can be particularly helpful to an entrepreneur with no commercial background.

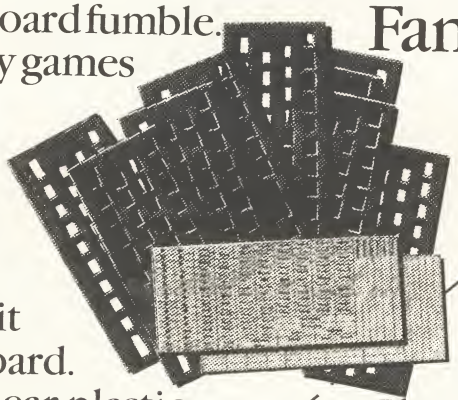
Despite the current volume of its daily trading, the Stock Exchange is no longer a practical way to raise money for a new project. A listing on the Stock Exchange requires time and a great deal of money. It tends to deal in the shares of large, well-established companies. The Unlisted Securities Market is faster and cheaper than the Stock Exchange. The Unlisted Securities Market is more risky for investors but the potential for profit is greater.

Put everything you need on the keyboard with a Custom Keypanel Kit.

At last! An end to keyboard fumble.

A must for all multikey games and a revolution for flight simulation, VU-CALC, VU-FILE and other sophisticated software.

Instantly changeable precision die-cut panels fit over your Spectrum keyboard.



Each kit comes in a clear plastic wallet and contains: 10 matt black Keypanels plus a sheet containing over 140 bright red self adhesive command labels, pre-printed with words and symbols – arrows, left, right, FIRE!, POWER!, etc, plus a sheet of blanks for your own designs.

The FIRST add-on for your Spectrum.

Fantastic value at only £2.95 plus p&p. for 10 Keypanels.

Post today to **Softeach Limited**, 25 College Road, Reading, Berkshire, RG6 1QE.

Please send me:

..... Custom Keypanel Kits at £2.95 + 25p p&p (overseas should add 25% for additional surface mail)

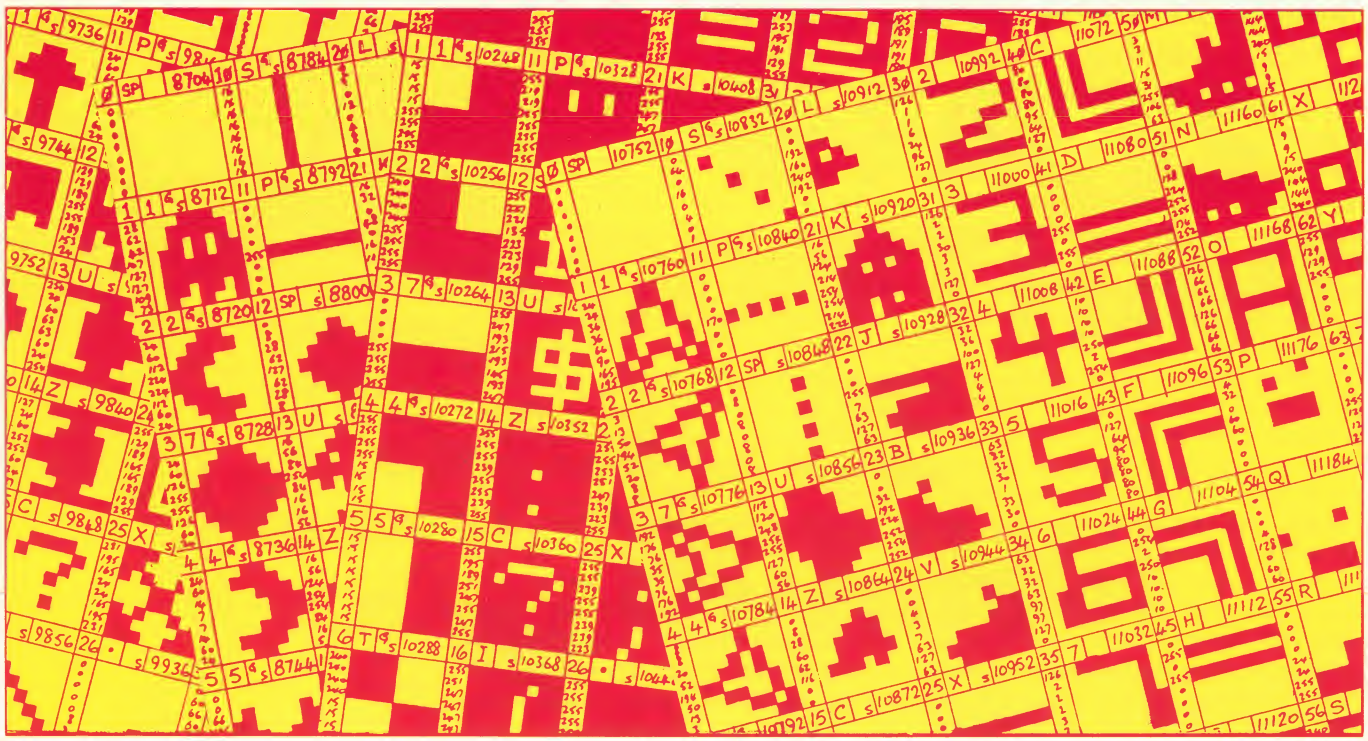
I enclose a total remittance of £ ..... cheques/postal orders payable to **Softeach Limited**.

NAME .....

ADDRESS .....

.....

Softeach Limited have no connection with any other software product mentioned in this advertisement.



Stephen Adams assesses the graphics ROM from dK'tronics and finds it to be good value and easy to install and flexible in its use.

Simple character change is available for the ZX-81

DK'TRONICS 4K graphics ROM consists of a small printed circuit board and a set of instructions on how to fit it to a ZX-81. It fits inside the ZX-81 case underneath the keyboard beside the heat sink and requires the soldering of only three joints to the ZX-81 printed circuit board if the ROM is in a socket.

It offers seven character sets as alternatives to the Sinclair one stored in the Basic ROM. The extra character sets each contain 64 characters which can be space invaders, faces, upper- and lower-case letters, tanks, aircraft and many more.

The instructions are very easy to understand but the construction must be done in the order suggested, or things can be complicated. The kit will also cope with a ZX-81 with 8K ROM soldered into the printed circuit board. That requires that you make a break in one of the copper tracks on the PCB next to the ROM and insert a plug over the ROM. That plug can be inserted over the ROM but I would suggest that you solder it to the ROM, or it may cause a bad contact at a later date.

There is a plug on the other end of the ribbon cable which is connected to the plug on the ROM, so that if the graphics board should malfunction at any time the whole board can be removed, leaving the ZX-81 still working.

If your ROM is in a socket it is removed and replaced with the plug. The ROM then rests in another socket on the graphics board. The ribbon cable connecting the two plugs must be bent

> 'The new sets of graphics can be used only one at a time'

hard in the order shown in the instructions for it to fit inside the case but, once fitted, I found the board locked satisfactorily into the space between the heat sink and a plastic post used to hold the case together.

The instructions for soldering the coloured wires are helped by the expanded sections of the ZX-81 printed circuit board shown in the diagrams. That makes it simple to make the connections and any spare wires can be inserted in the holes next to the +5V regulator — they are for expansion using the RAM socket or because the ROM was in a socket.

The only difficulty seemed to be that the various sockets on the board were supposed to be marked with coloured paint and there was none — not that it mattered, because the diagrams accompanying the kit are very good.

The last instruction reads: "Should you feel after reading these instructions that you are not able to fit the graphics ROM board, send it to us with £3 to cover post and packing". The company will then attach it to your ZX-81.

The new sets of graphics can be used only one at a time and the graphics from different sets cannot be mixed unless you have a user-definable graphics RAM chip inserted into the socket next to the ROM. Only one line of Basic needs to be used to call-up a new set of 64 graphics characters and so the graphics can be changed from within a program.

continued on page 48

Graphics ROM

continued from page 47

When using another graphics set, the listing will appear peculiar because all the characters, including numbers, letters and keywords, have been changed to the new character set. To restore some kind of readability, the Sinclair character set must be restored when LISTing or EDITing a program. A simple line in Basic such as 9999 LET L=USR 11939 will do that and all that is required is to GOTO 9999.

USR is required as the change can be done only in machine code. There is a different USR routine for each character set but all the routines are stored in the ROM, so no RAM is required.

Four demonstration programs are provided to demonstrate the use of the character sets, given a few lines of Basic, but after that you are on your own. The company has two very good programs which show the need for the extra characters. One of them is a machine code version of space invaders which produces proper missiles, invaders and explosions, as well as the laser bases.

They are all produced as individual characters, so that the whole thing is the same scale, with the flying saucers the same size as the aliens. That alone should save money.

The other program is also an arcade game, Centipede. Again written in machine code, it is virtually unbeatable. The Centipede breaks into several pieces if hit in the middle and the only way to defeat one is to hit it squarely on the head. Very good graphics, of course, are provided by the 4K ROM.

There are, however, several disappointments. One is the fact that the graphics can be printed-out only on the Sinclair printer by using a machine code routine stored above RAMTOP. That is because the printer routine changes the I register — which controls where the base of the character set is — back to the Sinclair character set. That means that only the ordinary characters will be printed.

The other is that the symbols on the sheets showing the graphics have no explanation as to how to use them. In the top left-hand corner is the character number and next to it on the same line is the character on the keyboard required to produce it. The next box shows whether or not SHIFT has to be pressed (S) or that you have to be in the GRAPHICS mode (GS). The next box contains the first address in memory of that character.

There are eight bytes — memory locations — used to store each character, one per line. The bits in those bytes give the dots for that line of the character; if the bit is binary 1 it is black and if it is binary 0 it is white. The decimal equivalents of those bytes are printed down the left-hand side of the graphics symbol and can be used for designing your own graphics characters if you decide to buy a RAM at a later date.

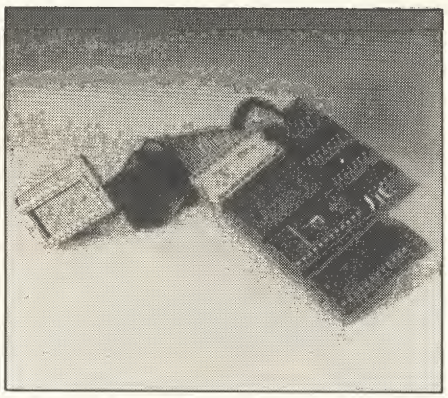
The graphics set also includes a set of upper- and lower-case letters but does not include numbers and instead it replaces them with punctuation marks, including an exclamation mark. I would have preferred to see the numbers retained, as although they are used only for bills and the like most people who would require a lower-case set would be businessmen to whom numbers are essential.

Most of the difficulties occur with a character set in ROM because it cannot be altered. The user-definable graphics set RAM chip — 1K or 2K versions are available — fits into the socket next to ROM on the 4K graphics board. That will allow you to store two or four character sets in RAM which can be selected from the graphics ROM or from Sinclair ROM — or they can be designed by you.

> 'Only one line of Basic needs to be used to call-up a new set of 64 characters and so the graphics can be changed from within a program'

The tape which accompanies the UDG gives 16K of explanation on how to transfer character sets into RAM, alter them character by character from ROM into RAM so that an 'A' may be replaced by a #, for instance. The tape is used to set up the character set you require for a particular program before running the program. There is even a facility by which the program can store the character set before the program required to run it on tape.

The program alters the character set in RAM and then LOADs the program which wants to use it. Once the character set is stored in RAM it is safe from any changes by the Basic — except POKE — as the Sinclair RAM for running the Basic program is separate.



The 4K ROM is stored at the 4K section above the 8K ROM — 8K–12K — and the 2K of RAM directly above that — 12K–14K — so if you have anything in that area it would be best to move it.

The UDG allows you to create your own graphics by using the routine stored on tape. That gives a large display of the character which is there at the moment and allows you to alter it line by line. That makes it very easy to see your graphic before you want to use it and to alter it if it is incorrect.

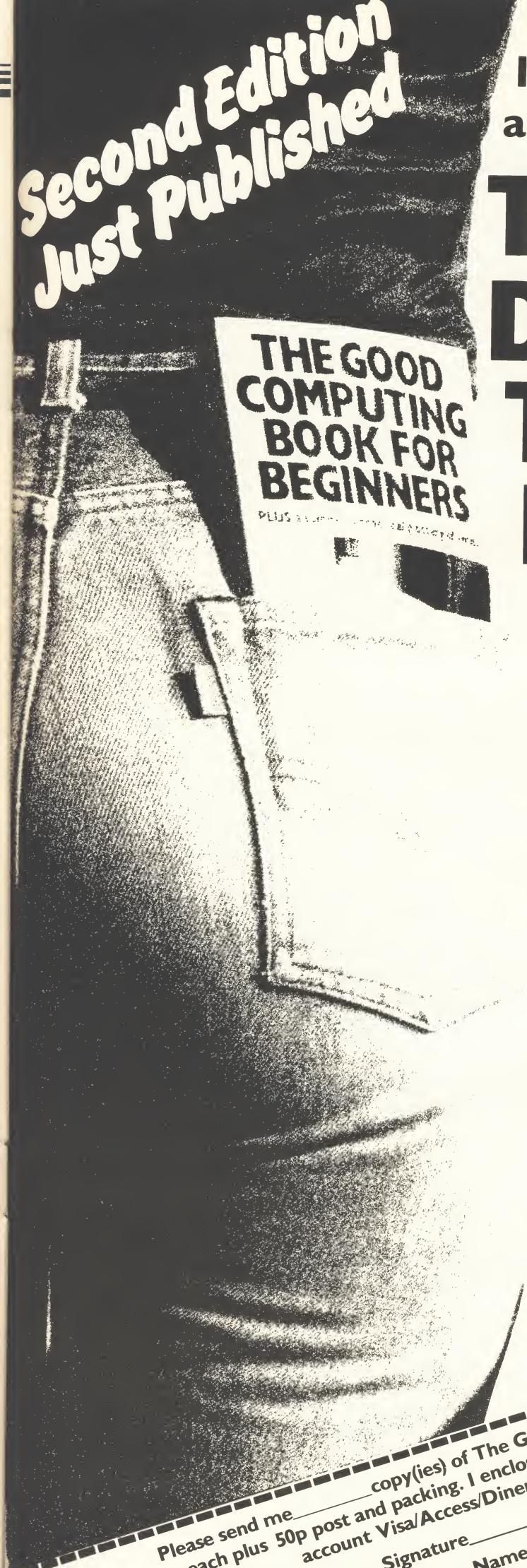
The tape, apart from the printer routine, is in Basic and is at times rather slow, especially when POKEing to change a set of characters, but it allows you to understand and alter the sections you dislike. That makes the graphics ROM come alive as the user can program the character set as he wishes — the ROM cannot be re-programmed.

The 4K graphics ROM is satisfactory for games and the like when all the characters you require are in one set. A number of building-block characters can be used to make your own characters from several small ones. On a 16in. TV the individual graphics characters are still only one-quarter of an inch high and the same in width, so that can be a great advantage.

The tape and the extra RAM to fit on the graphics board make the graphics ROM come alive. It is a pity that dK'tronics does not produce a similar tape for the ROM alone, as I am sure I am missing something by not knowing how to make maximum use of it.

The board is very good value and if more software can be written for it, should be even better.

The graphics ROM costs £29.95 and can be fitted by the company to your ZX-81 for an extra £3. The user-definable graphics RAM is £5.95 for 1K and £9.95 for 2K. Both RAMs are complete with the tape for controlling the character set. dK'tronics is at 23 Sussex Road, Gorleston, Great Yarmouth, Norfolk. Tel: 0493-602453.



If you want to know about computing . . .

THE FACTS DON'T HAVE TO BE BORING!

An entertaining, but **thorough** reference source with the most readable, comprehensive glossary you'll find anywhere. The Good Computing Book for Beginners is an essential A-Z of all the facts you need to know about computing — and none you don't!

Whether you're brand new to computing, or an old hand keen to stay ahead, you'll score by keeping this classic, top-selling book within reach to use again and again.

The author, Dennis Jarrett, is a successful journalist who was also founder editor of Which Computer? magazine — so his first edition quickly became a standard work. Now this new, substantially enlarged and revised edition covers the latest trends, terms and technology with the relevant facts — and ONLY the relevant facts — in **plain English.**

Here's another fact you'll find fascinating: **it will only cost you £2.95!**

Use the coupon below to get your copy right away — or buy it soon from your bookshop. It's the no-nonsense book you'll turn to again and again.

Please send me____ copy(ies) of The Good Computing Book for Beginners by Dennis Jarrett at £2.95 each plus 50p post and packing. I enclose a cheque for____ / Please debit my credit card account Visa/Access/Diners/Amey number____

Signature____

Name____ (please print clearly)

Address____

Send to: ECC PUBLICATIONS LIMITED
30-31 Islington Green
London N1 8BJ

THE **Midland Computer Fair**

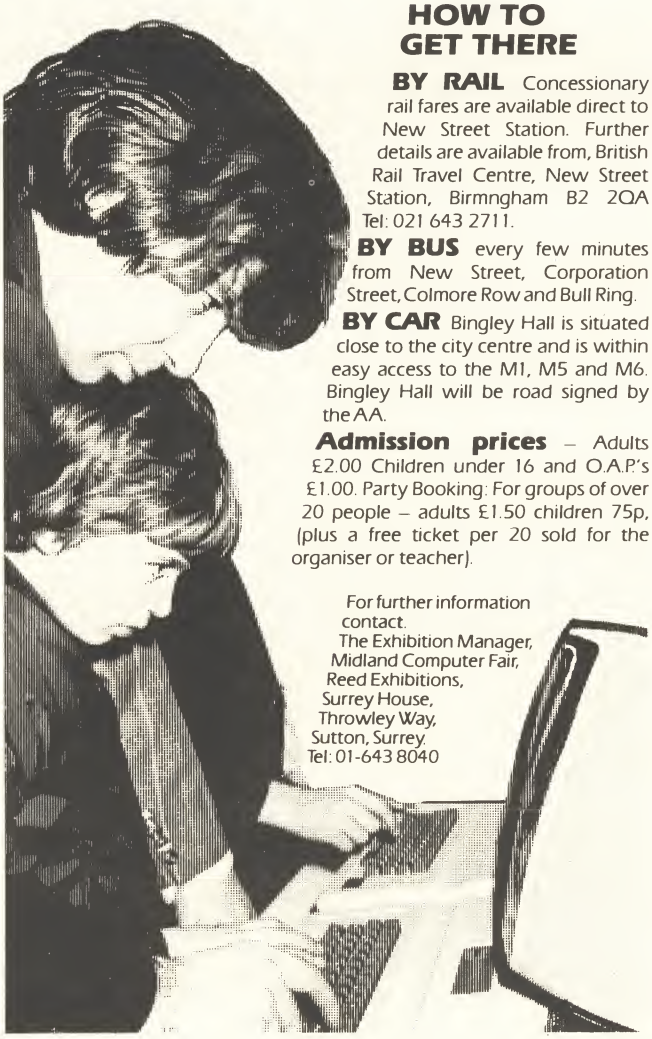
Personal computers
Home computing
Small business systems

BINGLEY HALL, BIRMINGHAM
28-30 APRIL 1983

Thurs & Fri 10am – 6pm
Saturday 10am – 5pm

Presented by YOUR COMPUTER Practical Computing

This event is the first of its kind in the Midlands, and gives you the opportunity to see and compare the enormous range of personal and home computers, small business systems, micro-computers, software packages, cassettes and scores of the very latest computer games – try them for yourself – decide how much, or how little it takes to build up your own personal computer system.



HOW TO GET THERE

BY RAIL Concessionary rail fares are available direct to New Street Station. Further details are available from, British Rail Travel Centre, New Street Station, Birmngham B2 2QA Tel: 021 643 2711.

BY BUS every few minutes from New Street, Corporation Street, Colmore Row and Bull Ring.

BY CAR Bingley Hall is situated close to the city centre and is within easy access to the M1, M5 and M6. Bingley Hall will be road signed by the AA.

Admission prices – Adults £2.00 Children under 16 and O.A.P's £1.00. Party Booking: For groups of over 20 people – adults £1.50 children 75p, (plus a free ticket per 20 sold for the organiser or teacher).

For further information contact.
The Exhibition Manager,
Midland Computer Fair,
Reed Exhibitions,
Surrey House,
Throwley Way,
Sutton, Surrey.
Tel: 01-643 8040

ZX SPECTRUM ZX SPECTRUM ZX SPECTRUM

CENTRONICS printer/RS232 serial INTERFACE
2 INTERFACES IN 1

To complement the 'best computer in the World' we have developed a superb interface. A CENTRONICS parallel *AND* a bi-directional RS232 interface in the same box.
Professional applications are now in easy reach.

Line length limited only by printer
Uses standard PRINT/LPRINT/LIST/LLIST statements
High resolution graphics with EPSON and NEC printer
Will print anything from the screen in graphics mode
Compatible with SINCLAIR printer and most other add-ons
Easy to use. Supplied with demonstration software on cassette
Uses standard printer cable available as an extra
Handshaking provided for both ports
Full bi-directional RS232 link
Software selectable BAUD rates
50/110/150/300/600/1200/2400 BAUD
Fully assembled, boxed and tested

This interface uses the built-in operating system to simplify use giving a highly professional performance that will enable the SPECTRUM to be used for real applications, e.g., Word-processing, computer aided design, process control, intelligent V.D.U., etc, etc.

ZX-81 ZX-81 ZX-81 ZX-81

CENTRONICS printer/RS232 INTERFACE

Easy to use
Line length limited only by printer
Uses inverse characters for lower case
Compatible with SINCLAIR printer, RAM packs etc.
Control codes can be sent to use your printer to the full
Firmware in ROM so LLIST and LPRINT functions always available
Will drive any printer with standard interface from your ZX-81
CENTRONICS and RS232 ports may be used to drive two devices together
Most popular BAUD rates available selectable by link
110/150/300/600/1200/2400/9600 BAUD
Handshaking provided for both ports
Fully assembled, boxed and tested with instructions manual

Word-processing and graphics software available soon.
S.A.E. for details.

CHEQUE / PO
Price £29.95 (+£4.50 VAT+£1.50 p&p. TOTAL: £35.95)

Please allow 10 working days for delivery

MOREX PERIPHERALS LTD
(Mail order only)

Dept. SU, 2 Balliol Road, Caversham, READING, Berkshire.
Tel: (0734) 478854. Telex: 849911 MOREXG

Computer Performance?

Fit HI-STAK for a better angle.

- comfortable, fast and reliable typing.
- easy to read keyboard

ZX81
SPECTRUM
VIC20
TRS80
NEW BRAIN
JUPITER ACE
ZX80
APPLE
etc.

HI-STAK by WARP FACTOR EIGHT

Order form: Please send me _____ HI-STAK set(s) (at £3.95 per set).

I enclose cheque/P.O. for _____

Name _____

Address _____

_____ Post code _____

To: Warp Factor Eight. (Dept SU)
6 Pelham Road, Braughing, Ware, Herts SG11 2QU.

They're here... the Space Zombies

This is the latest Space Arcade Game from MIKROGEN for 16K/48K Spectrum

* Full screen hi-res graphics
* 1 or 2 players * Joystick option *
* Full sound and colour * Three playing speeds *

The fastest and best Arcade Game made so far! ONLY £5.95

Please add 40p per order for post & packing

Name _____ Address _____

Mikrogen, Dept A1, 24 Agar Crescent, Bracknell, Berkshire, RG12 2BK
Access or Visa Card holders telephone (0344) 27317 (9am-6pm)

Home Computer Show Manchester

April

THURSDAY 21 (12am — 7pm)
FRIDAY 22 (10am — 6pm)
SATURDAY 23 (10am — 6pm)

AT THE **Midland Hotel**
PETER STREET

VISIT THE COMPLETE SHOW FOR THE HOME USER AND SEE:
A COMPLETE cross section of all hardware and software available to the home user.
A FULL RANGE of home computers priced from £50 upwards.
A COMPUTER ADVICE CENTRE run by independent experts for the answers to all your questions.

WIN WIN WIN TWO COMPUTERS — one for you, one for a school of your choice — to be won at each show: FREE entry form with advance tickets

ADULTS: £2.00 UNDER 8s & OAPs: FREE 25% DISCOUNT for parties of 20 or more

COMING SOON
MAY BRIGHTON
JUNE BIRMINGHAM

Sponsored jointly by:
Computing Today Personal Software
Personal Computing Today
Home Computing Weekly ZX Computing

Home Computer Show One person per coupon only
Please enclose SAE
Send £1.00 Save £1.00
Mr. Mrs. Miss _____
Address _____
SU

ASP Exhibitions
145 Charing Cross Road
London WC2H 0EE
01-437 1002

NEW SPECTRUM AND ZX81 SOFTWARE

"WINGED AVENGER"

Fast and furious. SPECTRUM version has SOUND and USER GRAPHICS. 7 LEVELS, 3 WAVES, MOTHER SHIP, HIGH SCORE, RE-FUELLING, RAPID FIRE, SMART BOMBS and LASER SHIELD. PCW "ONE OF THE BEST SINCLAIR GAMES YET". Only £4.50. All SPECTRUM + 16K ZX81.

"SPECTRUM SCRAMBLE"

MORE M/CODE ARCADE ACTION. "SO GOOD THE REVIEWERS DIDN'T REACH THE FINAL STAGE" (NOT BAD EH!!). NO LESS THAN 8 DIRECTIONAL KEYS for a SMOOTH MOVE. Full ARCADE features including, LASERS, BOMBS, INSTANT RESPONSE, CONTINUOUS SCORING, ROCKETS, SOUND, FUEL DUMPS, RED METEORS, DEFENDER CRAFT and HIGH SCORE. Beware CONDITION RED. With this one you MOVE, FIRE and BOMB AT THE SAME TIME. RELEASE PRICE of £4.95. 16K or 48K SPECTRUM.

"DO NOT PASS GO"
NOW THE 48K SPECTRUM VERSION IS READY

A COMPLETE SIMULATION of the BEST SELLING BOARD GAME, you know PARK LANE and all that. Up to SIX PLAYERS can compete with the MICRO doing all the WORK. Acts as DICE THROWER, BOARD, RENT COLLECTOR, UMPIRE, BANK, RULE BOOK, ACCOUNTANT and PROPERTY RECORD. SUPER GRAPHICS by Gary Kennedy (thanks mate). GAME SAVE with winner so far report. COMPLETE with INSTRUCTION BOOKLET. The ULTIMATE in FAMILY GAMES. Don't MONOPOLISE YOUR MICRO. AMAZE all your friends and family. (Can you see your GRANNY on a MICRO?) ONLY £6.95. 16K ZX81 VERSION ALSO £6.95.

"BASE INVADERS"

The ONLY ARCADE GAME EVERYBODY SHOULD HAVE. The SCREEN'S the same, THE INVADERS are the same, BUT you get a SHIELD and a CHOICE of THREE SPEEDS, (O.K., FAST or INCREDIBLE). GOOD SOUND, a HARD GAME, and GREAT GRAPHICS. COMPLETE your software collection for just £4.50. 16K and 48K SPECTRUM only.

"AUDIO SONICS"

WINNER of WIZZ KID 82. For the SPECTRUM. A.S. writes sound effects for your own programs. 26 PRE-SELECTED SOUND EFFECTS include TELEPHONE, POLICE SIREN, FROG, SPACE EFFECTS and OUTBOARD MOTOR. GO into MODIFY and you are presented with a display of SLIDER CONTROLS to adjust PITCH, RISE, FALL, BRISKNESS, DECEL, ACCELL, TONE, REPEAT RATE, STUTTER and DELAY. ADJUST the SLIDERS then INSTANTLY hear the SOUND CREATED. Call "THE SOUND ONE" and a program line will appear that is ready for insertion into your own programs. Hours of EXPLORATION. YOU WILL BE AMAZED what BEEP can DO. We are proud to offer this at £4.99. 16K or 48K SPECTRUM.

"SPECTRUM RENUMBER DELETE"

All M/CODE RENUMBERS ALL NOT PART. "YOU WON'T BUY A BETTER RENUMBER PROGRAM FOR THE SPECTRUM" JUST 600 BYTES. At £4.95. ALSO ZX81 VERSION.

"HIGH NOON"

When YOU'VE SAVED the GALAXY, SCRAMBLED or whatever else you do on your MICRO, what about a GUNFIGHT? Play the SPECTRUM or YOUR PALS. THREE LEVELS. FULL FEATURES, CACTI, COFFINS, WAGONS, RAPID or SINGLE SHOTS. SUPERB GRAPHICS. GOOD SOUND including DEATH MARCH. ESCAPISM on TAPE for JUST £4.50.

"DISPLAY"

Takes over when BIN and the DEMO tape left off. How would you like 273 different user defined GRAPHICS on a 16K SPECTRUM or a GRAND 336 for a 48K. All of these can be displayed on the screen at the SAME TIME. UDGs are stored as PAGES and any TWO PAGES may be exchanged in memory. FILES can be LOADED FROM or SAVED TO TAPE. LOAD into any page location, TURN a UDG ¼ turn, ½ turn, FLIP a SHAPE over, REVERSE a SHAPE, EXPAND ¼ of a CHARACTER into a full character, UP, DOWN, LEFT or RIGHT by one PIXEL. 5 SHAPE FILES are included on TAPE. INCLUDING a 64 CHARACTERS per LINE DISPLAY. COMPLETE with DEMO PROGRAM and INSTRUCTIONS. JUST RELEASED at £7.00. 48K or 16K SPECTRUM only.

"YAHTZI"

Up to SIX players allowed. Plays the classic DICE game of strategy. All electric scorepad complete with GARRY'S "CHUNKY LOOK" character set. All cheating and errors rejected by your electronic umpire. Update your games cupboard for £5.50. 48K ONLY.

"MATCALC"

For BUSINESS and PROFESSIONAL use. Ideal for WHAT IF situations, CASH FLOW FOREC STS and analysing RELATED figures. 64 character display option. FORMULA may be MATHEMATICAL or LOGICAL. MENU of FUNCTIONS. SAVE and LOAD DATA to TAPE. FULL instructions included. LITERALLY HUNDREDS of USES. BOTH 48K and 16K SPECTRUM PROGRAMS on ONE TAPE. JUST £7.00. EXCELLENT VALUE.

"PROGRAMMERS DREAM"

A SPECTRUM TOOLKIT. Position independent and just 1450 BYTES. Facilities RENUMBER lines or blocks any increment or start. BLOCK OR LINE MOVE including a RENUMBER into place if required. BLOCK OR LINE ERASE. CHANGE SELECTED STRINGS (NAMES OR CONTENTS). DUMP variable names and values (usable in a loop). DISPLAY PROGRAM or PROGRAM plus VARIABLE SIZE. INSTANT and CLEAN. JUST £6.95 with explicit instructions.

WORK FORCE

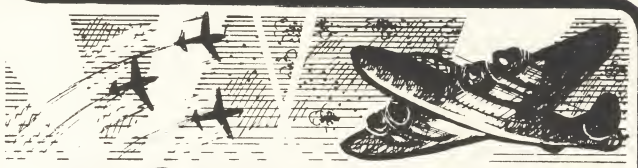
140 WILSDEN AVENUE, LUTON, BEDS, ENGLAND

ALSO AVAILABLE AT BUFFER, MICROWARE AND SOFTWARE SUPERMARKET.

REM WORK FORCE WORKS HARDER.

THIS SPACE INTENTIONALLY LEFT BLANK

Your masterpiece could appear here. We need good, original machine-code programs for the Spectrum and Oric. Excellent royalties or cash payments offered for high quality games. If you have written an exceptional program, please send a copy to the address below for immediate evaluation.



NIGHT GUNNER

Enemy aircraft approaching . . . BATTLESTATIONS!! Waves of enemy fighters swooping in for the attack? Can you survive another mission? This is the ULTIMATE challenge. An entertaining machine code game with excellent graphics. Requires 16K RAM pack only.

Highly addictive! **£4.95 inc.**

Now Available at major branches of WHSMITH

FIGHTER PILOT

15 feet . . . 7 feet . . . TOUCHDOWN! Instrument landings are not always as easy as this. You are in full control from take-off to landing during this real-time flight simulation of a jet fighter. Written by pilots — tested by pilots — for you to fly like a pilot.

'An excellent program!' Capt. H. Senior British Airways pilot.

Requires 16K RAM only **Super value at £4.45**

DIGITAL Integration

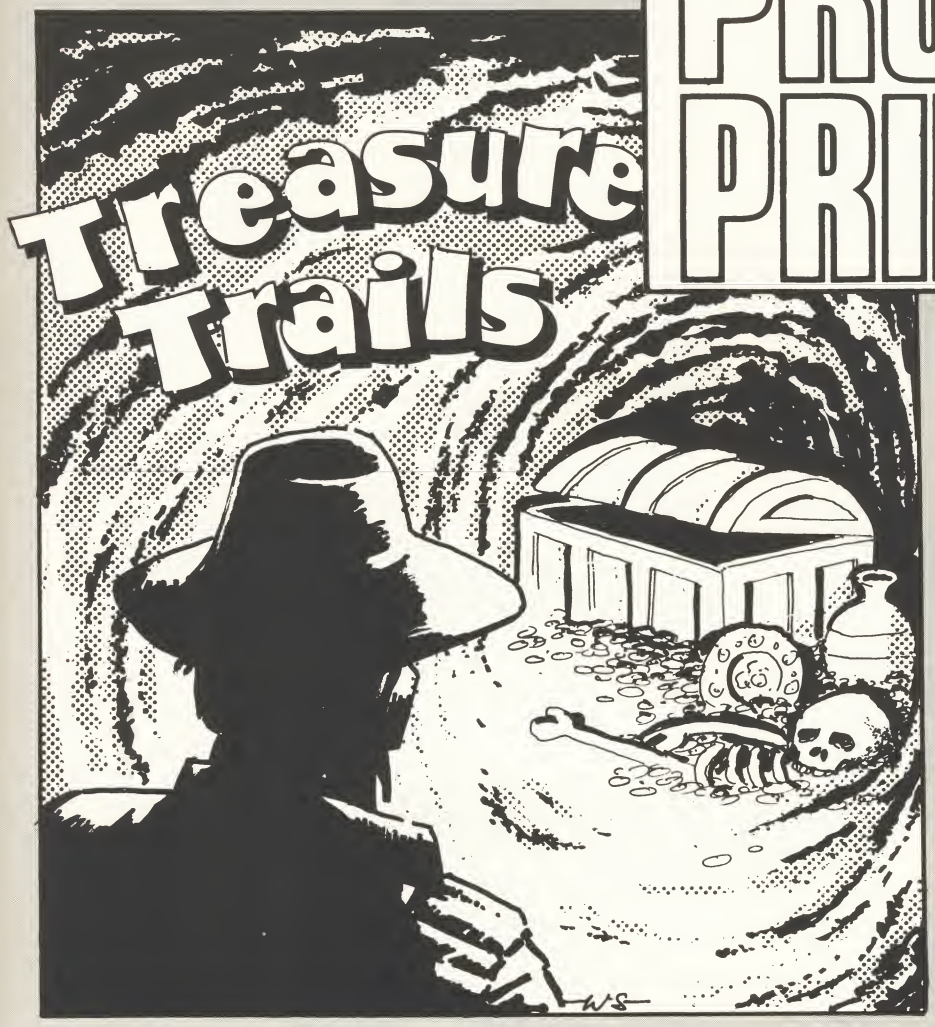
DIGITAL INTEGRATION
Dept. SU
22 Ash Church Road,
Ash, Aldershot
Hants GU12 6LX.

MAIL ORDER ONLY

TRADE ENQUIRIES WELCOME

All prices inclusive
(Overseas add £0.55 p&p per tape, £2.00 for HRG board)
All products guaranteed, refund if not satisfied.

PROGRAM PRINTOUT



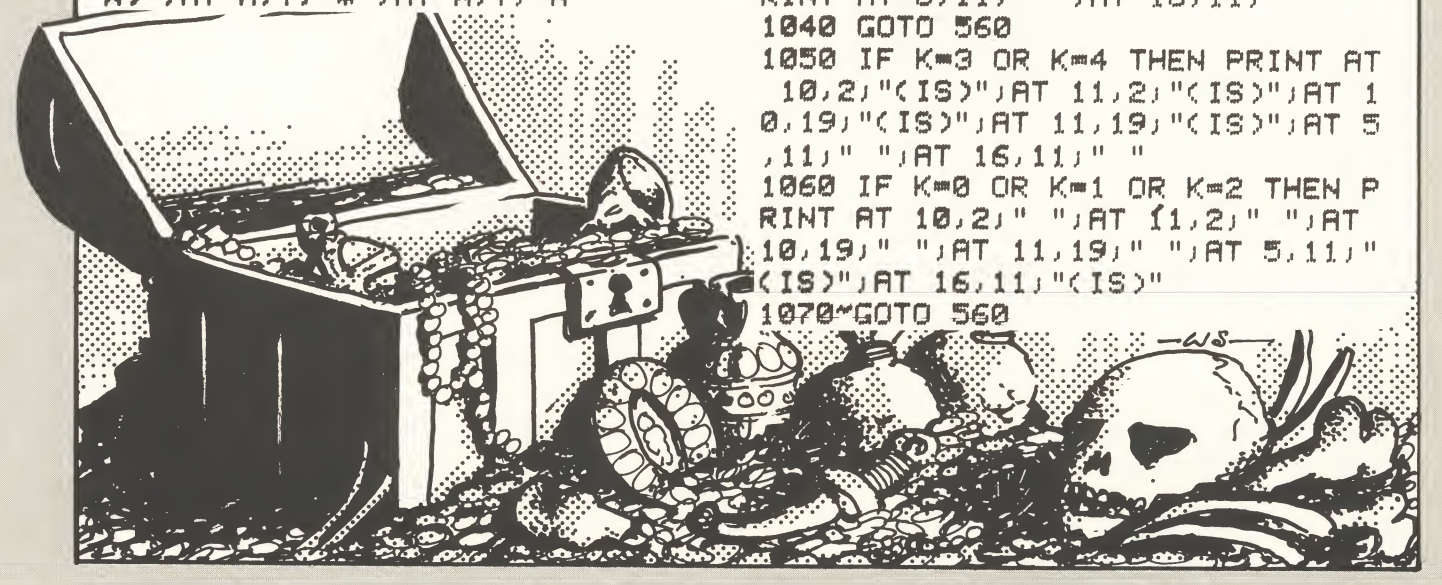
THE OBJECT of **Treasure Trails,** written by Adrian Laird of Norfolk for the 16K ZX-81, is to move quickly around a maze, collecting the treasure at the end of each passageway. That is made more difficult by the doors which open and shut, blocking your way, and causing you to lose a life if you run into them.

You score 50 points for each treasure you collect within your time limit and score bonus points for collecting your last treasure. Move using the usual cursor keys—5, 6, 7 and 8.

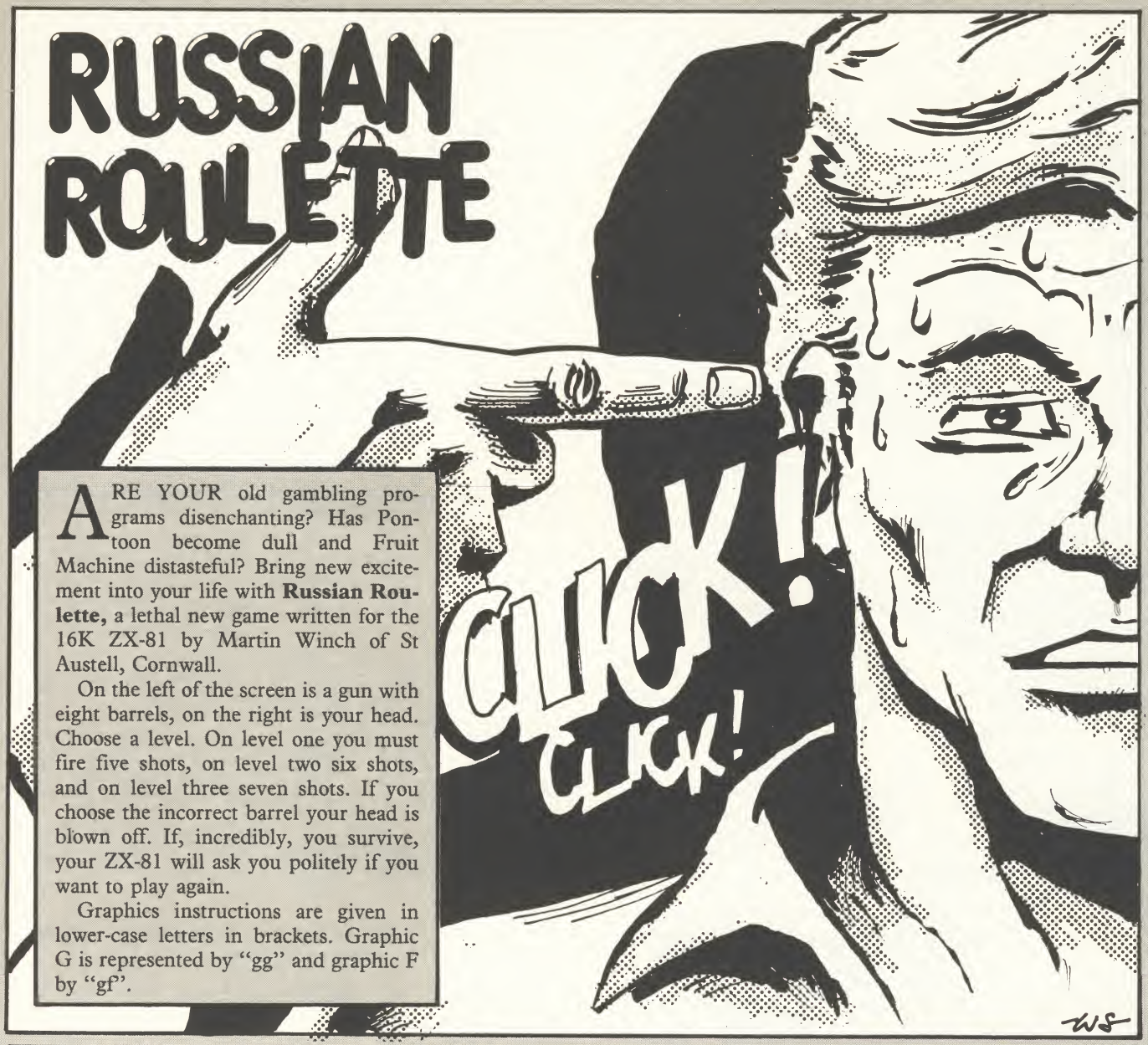
Graphics instructions are given in abbreviated form, separated by colons, in brackets. IS=Inverse space, IX=Inverse "X", GA=Graphic "A", G7=Graphic "7", and the like.

```
  10 REM GOLD RUSH
  20 REM BY A.LAIRD
  30 LET L=3
  40 LET SH=1
  50 LET SC=0
  60 IF SH=1 THEN LET TM=43
  70 IF SH=2 THEN LET TM=42
  80 IF SH=3 THEN LET TM=41
  90 IF SH=4 THEN LET TM=40
 100 IF SH=5 THEN LET TM=39
 110 IF SH=6 THEN LET TM=38
 120 IF SH=7 THEN LET TM=37
 130 IF SH>=8 THEN LET TM=36
 140 LET TR=8
 150 LET X=10
 160 LET Y=11
 170 PRINT AT 0,0;"(IS)SCORE:(6*
IS)SHEET:(3*IS)"
 180 FOR F=1 TO 20
 190 PRINT AT F,0;"(IS:20*GA:IS)
"
 200 NEXT F
 210 PRINT "(22*IS)"
 220 IF L=3 THEN PRINT AT 21,0;"
(IS:2*IX)"
 230 IF L=2 THEN PRINT AT 21,0;"
(IS:IX:IS)"
 240 IF L=1 THEN PRINT AT 21,0;"
(2*IS)"
 250 LET C=1
 260 FOR F=1 TO 20
 270 PRINT AT F,C;"  "
 280 LET C=C+1
 290 NEXT F
 300 LET C=1
 310 FOR F=20 TO 1 STEP -1
 320 PRINT AT F,C;"  "
 330 LET C=C+1
 340 NEXT F
 350 PRINT AT 10,0;"(IS:20*SPACE
:IS)"
 360 PRINT AT 11,0;"(IS:20*SPACE
:IS)"
 370 PRINT AT 1,21;"(IS)";AT 20,
21;"(IS)"
 380 FOR N=1 TO 20
 390 PRINT AT N,10;"    "
 400 NEXT N
 410 PRINT AT 7,10;"(3*G6)";AT 1
4,10;"(3*G7)"
 420 PRINT AT 10,8;"(G8)";AT 11,
8;"(G8)";AT 10,14;"(G5)";AT 11,1
```

```
4,"(G5)"
 430 PRINT AT 1,1,"*",AT 1,11,"*
",AT 1,20,"*",AT 11,1,"*",AT 11,
20,"*",AT 20,1,"*",AT 20,11,"*",
AT 20,20,"*"
 440 FOR F=0 TO TM
 450 PLOT 63,F
 460 NEXT F
 470 PRINT AT 18,30,"T",AT 19,30
,"I",AT 20,30,"M",AT 21,30,"E"
 480 PRINT AT 0,8,SC,AT 0,19,SH
 490 FOR K=0 TO 4
 500 PRINT AT X,Y,"X"
 510 PRINT AT X,Y," "
 520 IF K=3 OR K=4 THEN PRINT AT
 7,11," ",AT 14,11," ",AT 10,8,"
",AT 10,14," ",AT 5,5,"(IS)",AT
 5,17,"(IS)",AT 16,5,"(IS)",AT 1
6,17,"(IS)"
 530 IF K=0 OR K=1 OR K=2 THEN P
RINT AT 7,11,"(G6)",AT 14,11,"(G
7)",AT 10,8,"(G8)",AT 10,14,"(G5
)",AT 5,5," ",AT 5,17," ",AT 16,
5," ",AT 16,17," "
 540 IF SH=2 OR SH=3 THEN GOTO 1
020
 550 IF SH>=4 THEN GOTO 1050
 560 LET X=X+(INKEY$="6" AND X<2
0)-(INKEY$="7" AND X>1)
 570 LET Y=Y+(INKEY$="8" AND Y<2
0)-(INKEY$="5" AND Y>1)
 580 PRINT AT X,Y,
 590 LET Z$=CHR$ PEEK (PEEK 1639
8+256*PEEK 16399)
 600 IF Z$="*" THEN GOTO 670
 610 IF Z$<>" " THEN GOTO 880
 620 NEXT K
 630 UNPLOT 63,TM
 640 LET TM=TM-1
 650 IF TM=-1 THEN GOTO 880
 660 GOTO 490
 670 LET SC=SC+50
 680 PRINT AT 0,8,SC
 690 FOR F=0 TO 10
 700 PRINT AT X,Y,"X",AT X,Y,"(I
X)",AT X,Y,"*",AT X,Y,"X"
 710 NEXT F
 720 LET TR=TR-1
 730 LET TM1=TM
 740 IF TR=0 THEN GOTO 810
 750 IF SH=2 OR SH=3 THEN LET TM
=TM+1
 760 IF SH>=4 THEN LET TM=TM+2
 770 FOR F=TM1 TO TM
 780 PLOT 63,F
 790 NEXT F
 800 GOTO 490
 810 FOR F=TM TO 0 STEP -1
 820 LET SC=SC+50
 830 UNPLOT 63,F
 840 PRINT AT 0,8,SC
 850 NEXT F
 860 LET SH=SH+1
 870 GOTO 60
 880 FOR F=0 TO 10
 890 PRINT AT X,Y-1,"(G4,GT,G3)"
,AT X+1,Y-1,"(G1,G2,G2)",AT X-1,
Y-1,"(G4,G4,G3)",AT X,Y-1,"(G1,G
2,G2)",AT X+1,Y-1,"(G2,G3,G3)",A
T X-1,Y-1,"(G1,G3,G4)"
 900 NEXT F
 910 LET L=L-1
 920 IF L=0 THEN GOTO 940
 930 GOTO 60
 940 PRINT AT 0,22,"PRESS A",AT
1,22,"KEY TO",AT 2,22,"PLAY AGAI
N"
 950 PRINT AT 21,0,"(2*IS)"
 960 FOR N=0 TO 100000
 970 PRINT AT 0,8,SC,AT 0,8,"(5*
IS)"
 980 IF INKEY$<>"" THEN GOTO 100
0
 990 NEXT N
1000 PRINT AT 0,22,"          ",AT
 1,22,"          ",AT 2,22,"
  "
1010 RUN
1020 IF K=3 OR K=4 THEN PRINT AT
 5,11,"(IS)",AT 16,11,"(IS)"
1030 IF K=0 OR K=1 OR K=2 THEN P
RINT AT 5,11," ",AT 16,11," "
1040 GOTO 560
1050 IF K=3 OR K=4 THEN PRINT AT
 10,2,"(IS)",AT 11,2,"(IS)",AT 1
0,19,"(IS)",AT 11,19,"(IS)",AT 5
,11," ",AT 16,11," "
1060 IF K=0 OR K=1 OR K=2 THEN P
RINT AT 10,2," ",AT 11,2," ",AT
10,19," ",AT 11,19," ",AT 5,11,"
(IS)",AT 16,11,"(IS)"
1070 GOTO 560
```



RUSSIAN ROULETTE



ARE YOUR old gambling programs disenchanting? Has Pontoon become dull and Fruit Machine distasteful? Bring new excitement into your life with **Russian Roulette,** a lethal new game written for the 16K ZX-81 by Martin Winch of St Austell, Cornwall.

On the left of the screen is a gun with eight barrels, on the right is your head. Choose a level. On level one you must fire five shots, on level two six shots, and on level three seven shots. If you choose the incorrect barrel your head is blown off. If, incredibly, you survive, your ZX-81 will ask you politely if you want to play again.

Graphics instructions are given in lower-case letters in brackets. Graphic G is represented by "gg" and graphic F by "gf".

```
  1 CLS
  5 GOSUB 5000
 10 FAST
 12 CLS
 15 LET T=0
 20 LET A=INT (RND*8)+1
 50 FOR I=0 TO 63
 55 PLOT I,43
 57 PLOT I,10
 60 NEXT I
 65 FOR I=10 TO 43
 67 PLOT 0,I
 69 PLOT 63,I
 70 NEXT I
100 PRINT AT 7,0;"(11*gg)"
110 PRINT AT 8,0;"(11*gf)"
115 PLOT 5,25
120 PLOT 5,24
125 PLOT 5,23
130 PLOT 5,22
135 PLOT 5,21
140 PLOT 4,21
150 PLOT 3,21
155 PLOT 2,21
157 PLOT 1,21
160 GOSUB 700
175 PLOT 2,22
180 PLOT 62,35
185 PLOT 61,34
190 PLOT 60,33
195 PLOT 59,32
200 PLOT 58,31
205 PLOT 57,30
210 PLOT 57,29
215 PLOT 57,28
220 PLOT 57,27
225 PLOT 57,26
230 PLOT 57,25
235 PLOT 57,24
240 PLOT 57,23
245 PLOT 58,22
250 PLOT 59,21
255 PLOT 60,20
260 PLOT 61,19
265 PLOT 62,18
270 PRINT AT 6,30;"O"
275 PLOT 62,23
280 PLOT 56,27
285 SLOW
290 PRINT AT 18,0;"WHICH BARREL
?(1 TO 8)"
295 DIM X$(1)
300 INPUT X$(1)
303 IF CODE X$<29 OR CODE X$>36
THEN GOTO 290
305 LET T=T+1
306 PRINT AT 20,0;"TRIES=";T
307 PRINT AT 21,0;"NUMBERS TRIE
D;"
308 PRINT AT 21,14+T*2;X$;" "
317 PRINT AT 18,0;"
                    "
320 GOSUB 750
340 GOSUB 800
345 GOSUB 900
350 IF A=VAL X$ OR T>=L THEN GO
TO 360
355 GOTO 290
360 IF T>=L THEN GOTO 3000
370 IF A=VAL X$ THEN FOR I=11 T
O 27
380 PRINT AT 7,I;"."
390 PRINT AT 7,I;"  "
400 NEXT I
410 CLS
420 PRINT "BAD LUCK.ANOTHER GAM
E?"
430 IF INKEY$="" THEN GOTO 430
440 IF INKEY$="Y" THEN RUN
450 GOTO 10000
700 PLOT 4,24
705 PLOT 3,23
710 PLOT 2,22
720 RETURN
750 UNPLOT 4,24
755 UNPLOT 3,23
760 UNPLOT 2,22
765 RETURN
800 PLOT 3,24
805 PLOT 2,23
810 PLOT 1,22
815 PLOT 4,25
830 RETURN
900 UNPLOT 3,24
905 UNPLOT 2,23
910 UNPLOT 1,22
915 UNPLOT 4,25
920 GOSUB 700
930 RETURN
3000 CLS
3005 PRINT "WELL DONE.";
3008 IF L<7 THEN PRINT "NOW TRY
THE NEXT LEVEL"
5000 PRINT ,,"WHICH LEVEL?(1,2 O
R 3)"
5010 INPUT L
5013 IF L>3 OR L<1 THEN GOTO 501
0
5015 LET L=L+4
5020 RETURN
9990 SAVE "p"
9999 RUN
```

SKI RUN

PHILIP HARPER, aged nine, of Benfleet, Essex sent **Ski-Run** for the 16K Spectrum. Manipulate your skier round the flags using cursor keys 6 and 7. You have 10 lives in which to complete the ski run as many times as possible.

It is an ideal game for people who find that manipulation of characters by the use of four or eight keys is, as yet, beyond them.

4 Graphic S, graphic F
8 Graphic L

—WS—

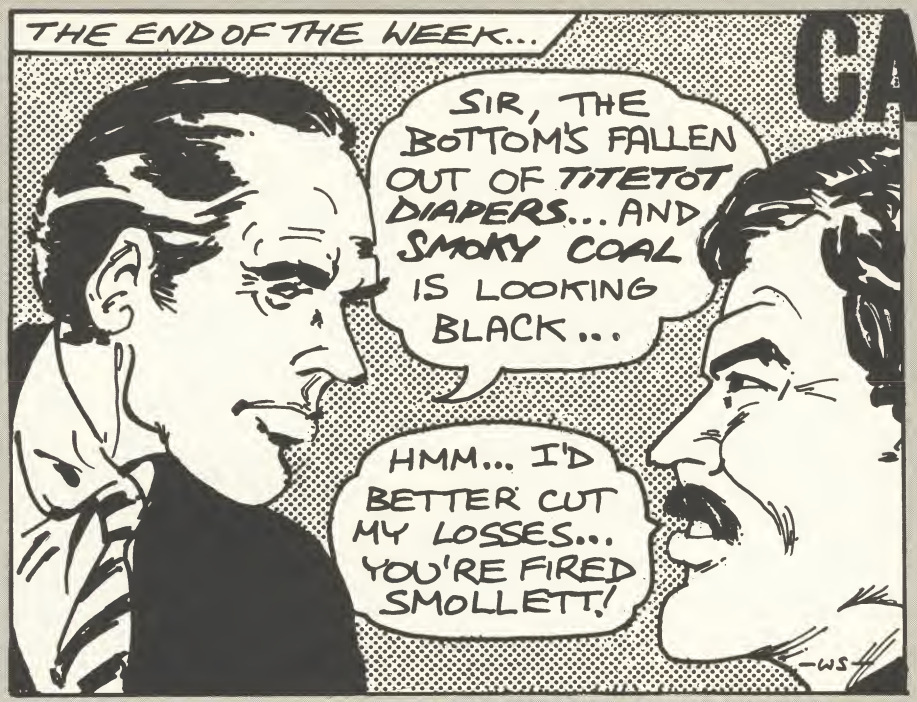
```
    1 REM "ski": CLS
    2 LET s=10: PRINT FLASH 1; IN
K 2; PAPER 6;AT 1,5;"PLEASE STOP
 THE TAPE": PRINT AT 2,3;"Press
any key to continue": PAUSE 0
    3 CLS : GO SUB 1000
    4 PRINT AT 1,13;"SKI","Ski is
 a game of skill and it is";"als
o very addictive.                ";"
Use keys 6 & 7 to steer your
";"skier,(■),round the flags,(■)
.","      You have got 10 lives!":
INK 1: PRINT : PRINT : PRINT "
Press any key to continue": PAUS
E 0
    5 CLS : PRINT AT 10,0;"Skiers
 left";: FOR f=s TO 0 STEP -1: P
RINT INK 1;"■ ";: NEXT f: IF s=-
1 THEN GO TO 5000
    6 LET a=1: BORDER 5: PAPER 7:
 INK 2
    7 PRINT BRIGHT 1; PAPER 7; IN
K 2;AT 1,0;"
                ■          ■
          ",AT 2,0; BRIGHT 1;
PAPER 7; INK 2;"          ■
          ■
               ■"
    8 PRINT AT 3,0; INK 0; PAPER
6;"
  ",AT 4,0; PAPER 7;"
          ";AT 0,0; INK 0; PAPER 6
;"
  "
    9 PLOT 0,0: DRAW 255,0: DRAW
0,175: DRAW -255,0: DRAW 0,-175
   10 FOR f=1 TO 31
   20 PRINT BRIGHT 1; PAPER 7; IN
K 1;AT a,f;"■"
   21 IF (a=1) AND ((f=6) OR (f=1
8) OR (f=27)) THEN GO TO 3000
   22 IF (a=2) AND ((f=4) OR (f=1
3) OR (f=22) OR (f=31)) THEN GO
TO 3000
   25 BEEP .002,f: PRINT AT a,f;
BRIGHT 1; PAPER 7;" "
   26 LET a=a+(INKEY$="6" AND a<2
)-(INKEY$="7" AND a>1)
   30 NEXT f
   35 LET g=g+1
   40 PRINT FLASH 1; PAPER 1; INK
 7;AT 5,10;"WELL DONE!!"
   50 BEEP .1,5: PAUSE 5: BEEP .1
,6: PAUSE 5: BEEP .1,5: PAUSE 5:
 BEEP .1,6: BEEP .9,8
   60 GO TO 5
1000 LET g=0: FOR f=0 TO 7: READ
 z: POKE USR "s"+f,z: NEXT f
1010 FOR f=0 TO 7: READ z: POKE
USR "f"+f,z: NEXT f
1020 FOR f=0 TO 7: READ z: POKE
USR "l"+f,z: NEXT f
1040 FOR f=0 TO 7: READ z: POKE
USR "e"+f,z: NEXT f
1090 RETURN
2000 DATA BIN 00011000,BIN 00011
000,BIN 00010000,BIN 00011111,BI
N 00011010,BIN 00011010,BIN 0001
0001,BIN 11111111
2010 DATA BIN 10000000,BIN 11101
111,BIN 11111110,BIN 11111100,BI
N 11111110,BIN 11111111,BIN 1000
0000,BIN 10000000
2020 DATA 255,0,0,0,0,0,0,255
2040 DATA 0,0,0,BIN 01001001,BIN
 00101010,0,BIN 00101010,BIN 010
01001
3000 FOR q=0 TO 7: PRINT BRIGHT
1; PAPER 7; FLASH 1; INK INT (RN
D*7);AT a,f;"■"
3010 BEEP .1,-45: NEXT q
3015 LET s=s-1
3016 LET g=g+1
3020 GO TO 60
4000 STOP
5060 PLOT 0,0: DRAW 255,0: DRAW
0,175: DRAW -255,0: DRAW 0,-175:
 PRINT AT 6,7;"Want another go?"
,AT 7,13;"(y/n)"
5065 PRINT AT 1,1,"You finished
with ";g;" runs"
5070 IF INKEY$="y" THEN CLS : LE
T s=10: GO TO 5
5080 IF INKEY$="n" THEN CLS : GO
 TO 4000
5090 GO TO 5070
```

DOTS

JONATHON RANGER, aged 12, has composed a game of chance for two players which can be played on the 16K ZX-81. A grid of dots is printed on the screen and you and your opponent take turns to remove a lot to gain the points it hides. The idea is straightforward but the result remains in doubt throughout the game.

Graphics instructions are listed in lower-case letters in brackets, separated be semi-colons. Spaces are represented by "sp" and inverse spaces by "isp".

```
    1 GOSUB 1000
    2 FAST
    3 CLS
    6 LET K=0
    7 LET J=0
    8 LET F=0
    9 DIM Z(6,10)
   10 PRINT AT 1,0;"  1  2  3  4
 5  6  7  8  9  10"
   20 FOR A=1 TO 6
   30 PRINT AT A*3;0;A;"(sp:isp:2
*sp:isp:2*sp:isp:2*sp:isp:2*sp:i
sp:2*sp:isp:2*sp:isp:2*sp:isp:2*
sp:isp:2*sp:isp:sp)"
   40 NEXT A
   45 FOR A=1 TO 6
   50 FOR B=1 TO 10
   55 LET Z(A,B)=120
   60 NEXT B
   65 NEXT A
   66 SLOW
   70 LET G=F/2
   71 LET H=INT G
   72 IF H=G THEN PRINT AT 21,0;A
$;"          "
   73 IF H<>G THEN PRINT AT 21,0;
B$;"          "
   75 PRINT AT 19,0;"DOWN: "
   80 INPUT X
   85 PRINT AT 20,0;"
          "
   90 IF X>0 AND X<7 THEN GOTO 14
0
   95 PRINT AT 20,0;"OUT OF RANGE
 ENTER AGAIN"
  100 GOTO 80
  140 PRINT AT 19,0;"ALONG: "
  145 INPUT Y
  150 PRINT AT 20,0;"
          "
  160 IF Y>0 AND Y<11 THEN GOTO 1
90
  170 PRINT AT 20,0;"OUT OF RANGE
 ENTER AGAIN"
  180 GOTO 145
  200 IF Z(X,Y)<>120 THEN GOTO 70
  205 LET Z(X,Y)=0
  210 LET E=INT (RND*9)+1
  220 LET C=X*3
  230 LET D=Y*3-1
  240 PRINT AT C,D;E
  250 LET F=F+1
  260 LET G=F/2
  270 LET H=INT G
  280 IF H=G THEN GOTO 310
  290 LET J=J+E
  300 GOTO 320
  310 LET K=K+E
  320 PRINT AT 0,0;B$;" ";K;AT 0,
15;A$;" ";J
  330 IF F<60 THEN GOTO 70
  340 FOR A=1 TO 30
  350 NEXT A
  360 CLS
  370 IF K>J THEN PRINT AT 10,10;
B$;" WON"
  380 IF J>K THEN PRINT AT 10,10;
A$;" WON"
  390 PRINT AT 13,0;"PRESS ANY KE
Y TO RESTART"
  400 IF INKEY$<>"" THEN RUN
  410 GOTO 400
 1000 CLS
 1010 PRINT "PLEASE ENTER TWO NAM
ES"
 1020 PRINT "EACH LESS THAN 9 LET
TERS"
 1030 INPUT A$
 1040 IF LEN A$<9 THEN GOTO 1070
 1050 PRINT "less than 9 letters"
 1060 GOTO 1030
 1070 INPUT B$
 1080 IF LEN B$<9 THEN RETURN
 1090 PRINT "less than 9 letters"
 1100 GOTO 1070
 2000 SAVE "DOTs"
 2010 PRINT "ENTER ANY NUMBER"
 2020 INPUT Q
 2030 RAND Q
 2040 RUN
```



CASHFLOW

KAREN CRUICKSHANK of Guildford, Surrey has sent a program for the Spectrum, based on the workings of the Stock Exchange. You are given a working week in which to make as much money as possible by buying and selling stocks and shares. Each day you must decide eight times whether to buy or sell bonds.

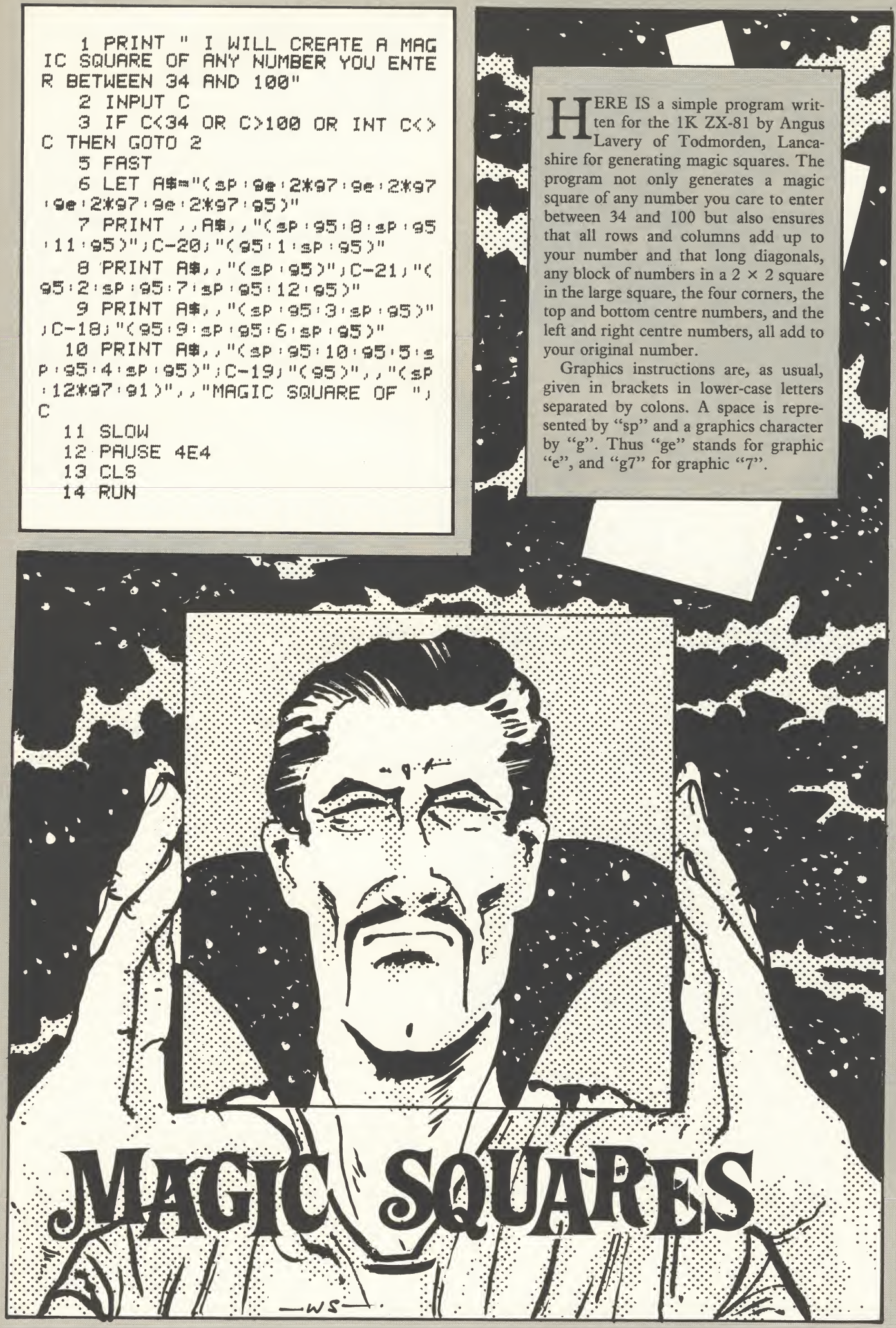
Decisions you can make are based on the information given, including how much cash you have in hand and the market forecast. Beware—your boss could arrive at any minute and decide to alter your cashflow situation. It is an original game calling for planning and skill. Can you make sufficient money to be appointed manager at the end of the week?

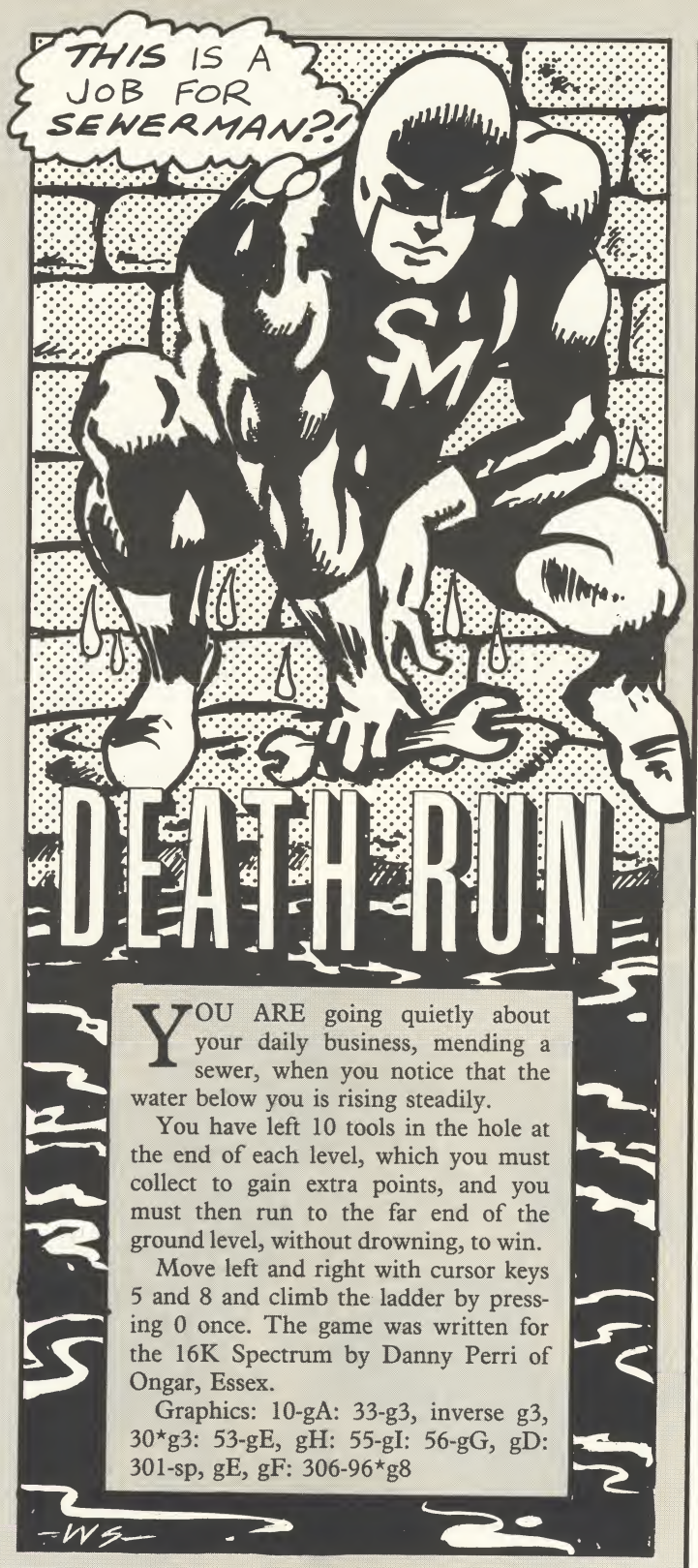
```
   1 LET HS=0
   3 LET B=10: LET CA=1000: LET
P=10
   5 PAPER 0: INK  : BORDER 0: B
RIGHT 1: CLS
   6 FOR W=1 TO 5: IF W=1 THEN P
RINT "MONDAY"
   7 IF W=2 THEN PRINT "TUESDAY"
   8 IF W=3 THEN PRINT "WEDNESDA
Y"
   9 IF W=4 THEN PRINT "THURSDAY
"
  10 IF W=5 THEN PRINT "FRIDAY"
  14 PRINT FLASH 1'"A NEW WORKIN
G DAY"
  15 POKE 23658,8
  20 FOR Q=1 TO 12: BEEP 0.05,Q:
 NEXT Q
 120 FOR D=1 TO 8
 122 LET RN=INT (RND*10)
 123 GO SUB 2000
 125 PRINT '"WORKING SEGMENT ";
D
 127 IF P<0 THEN LET P=0
 135 LET Q=INT (RND*5)
 136 PRINT PAPER 6; INK 0;'"REP
ORT:"'
 137 IF CA>=0 THEN PRINT "CASH A
T HAND £";CA
 139 IF CA<0 THEN PRINT "OVERDRA
FT £";CA
 140 PRINT B;" BONDS AT £";P;" E
ACH"
 145 PRINT "OVERALL ASSETS £";(P
*B)+CA
 150 PRINT "MARKET FORCAST ";
 160 IF Q=0 THEN PRINT "STEADY":
 LET P=P+(INT (RND*3)-2)
 170 IF Q=1 THEN PRINT "CHANGEAB
LE": LET P=P+(INT (RND*23)-10)
 180 IF Q=2 THEN PRINT "PLUMMETT
ING": LET P=P+(INT (RND*50)-40)
 190 IF Q=3 THEN PRINT "RISING":
 LET P=P+(INT (RND*50)-15)
 195 IF Q=4 THEN PRINT "UNCERTAI
N!!": LET P=P+(INT (RND*60)-30)
 200 INPUT "SELL OR BUY? ";A$
 210 BEEP 0.05,50
 220 IF A$="SELL" THEN GO TO 500
 230 IF A$<>"BUY" THEN GO TO 200
 240 LET NS=INT (RND*100)+25
 242 PRINT '"THERE ARE ";ns;" B
ONDS AVAILABLE"
 243 IF P<=0 THEN LET P=1
 245 PRINT "HOW MANY BONDS AT £"
P;" EACH"
 250 INPUT X
 255 BEEP 0.08,50
 257 IF X>NS THEN PRINT '"I SAID
 ";NS;" BONDS NOT ";X;" BONDS":
LET NS=NS-1: GO TO 242
 260 IF CA<CA-P*X THEN PRINT "NO
T ENOUGH MONEY": GO TO 240
 279 LET CA=CA-P*X
 290 LET B=B+X
 295 PRINT ''
 304 NEXT D
 306 GO TO 700
 510 LET BU=INT (RND*200)+50
 515 IF P<=0 THEN LET P=1
 520 PRINT '"MARKET PRICE £";P
 525 PRINT BU;" BUYERS WANTING B
UNDS"
 530 PRINT "HOW MANY BONDS TO SE
LL?"
 540 INPUT S
 545 BEEP 0.09,50
 546 IF S>BU THEN PRINT '"I SAI
D ";BU;" BUYERS": LET BU=BU-1: G
O TO 525
 550 IF S>B THEN PRINT "YOU HAVE
N'T THAT MANY BONDS": GO TO 530
 555 IF S<0 THEN GO TO 525
 560 LET CA=P*S+CA
 595 LET B=B-S
 600 PRINT '': NEXT D
 700 FOR Q=-30 TO 30
 705 BEEP 0.005,Q
 706 NEXT Q
 710 IF W<>5 THEN PRINT '''"THE
 END OF THE DAY"
 715 IF W=5 THEN PRINT '''"THE
END OF THE WEEK"
 720 PRINT "CASH ";CA
 730 PRINT B;" BONDS AT £";P
 740 PRINT "TOTAL ASSETS £";: LE
T O=(P*B)+CA: PRINT O
 742 IF W=5 THEN GO TO 749
 745 IF INKEY$="" THEN GO TO 745
 747 CLS : NEXT W
 750 IF O<0 THEN PRINT " YOU'RE
FIRED !!!!!!"
 760 IF O>0 AND O<9000 THEN PRIN
T "YOU DO NOT USE ENOUGH INITIAT
IVE"
 765 IF O>9000 AND O<25000 THEN
PRINT "PROMOTION TO HEAD CASHIER
!!"
 770 IF O>25000 AND O<45000 THEN
 PRINT "PROMOTION TO CHIEF SUPER
VISOR"
 775 IF O>HS THEN LET HS=O
 780 IF O>45000 THEN PRINT "THE
MANAGERS SEAT AWAITS YOU"
 785 PRINT '"HIGH SCORE £";HS
 790 PRINT '''"                PRESS ANY
KEY"
 800 IF INKEY$="" THEN GO TO 800
 810 CLS : GO TO 2
2010 IF RN=1 THEN PRINT '"SUDDE
N DEVALUATION HAS MEANT": PRINT
"THAT TWO BONDS ARE BEING MERGED
": PRINT "INTO ONE.IE: CUT IN HA
LF"
2020 IF RN=1 THEN LET B=INT (B/2
)
2025 LET C=INT (RND*3)
2030 IF RN=2 THEN PRINT '"BOSS
IS COMING AROUND CHECKING.": PAU
SE 100: IF C=0 THEN PRINT "HAD Y
OU WORRIED!!"
2040 IF RN=2 AND C=1 THEN PRINT
"HE CUTS OFF YOUR CASH SUPPLY BY
": PRINT "HALF. (HA,HA,HA)": LET
 CA=CA/2
2050 IF RN=2 AND C=2 THEN PRINT
"GIVES YOU EXTRA 100 BONDS.": LE
T B=B+100
2100 RETURN
```

```
  1 PRINT " I WILL CREATE A MAG
IC SQUARE OF ANY NUMBER YOU ENTE
R BETWEEN 34 AND 100"
  2 INPUT C
  3 IF C<34 OR C>100 OR INT C<>
C THEN GOTO 2
  5 FAST
  6 LET A$="(sp:g@:2*g7:g@:2*g7
:g@:2*g7:g@:2*g7:g5)"
  7 PRINT ,,A$,,"(sp:g5:8:sp:g5
:11:g5)";C-20;"(g5:1:sp:g5)"
  8 PRINT A$,,"(sp:g5)";C-21;"(
g5:2:sp:g5:7:sp:g5:12:g5)"
  9 PRINT A$,,"(sp:g5:3:sp:g5)"
;C-18;"(g5:9:sp:g5:6:sp:g5)"
 10 PRINT A$,,"(sp:g5:10:g5:5:s
p:g5:4:sp:g5)";C-19;"(g5)",,"(sp
:12*g7:g1)",,"MAGIC SQUARE OF ";
C
 11 SLOW
 12 PAUSE 4E4
 13 CLS
 14 RUN
```

HERE IS a simple program written for the 1K ZX-81 by Angus Lavery of Todmorden, Lancashire for generating magic squares. The program not only generates a magic square of any number you care to enter between 34 and 100 but also ensures that all rows and columns add up to your number and that long diagonals, any block of numbers in a 2 × 2 square in the large square, the four corners, the top and bottom centre numbers, and the left and right centre numbers, all add to your original number.

Graphics instructions are, as usual, given in brackets in lower-case letters separated by colons. A space is represented by "sp" and a graphics character by "g". Thus "ge" stands for graphic "e", and "g7" for graphic "7".





YOU ARE going quietly about your daily business, mending a sewer, when you notice that the water below you is rising steadily.

You have left 10 tools in the hole at the end of each level, which you must collect to gain extra points, and you must then run to the far end of the ground level, without drowning, to win.

Move left and right with cursor keys 5 and 8 and climb the ladder by pressing 0 once. The game was written for the 16K Spectrum by Danny Perri of Ongar, Essex.

Graphics: 10-gA: 33-g3, inverse g3, 30*g3: 53-gE, gH: 55-gI: 56-gG, gD: 301-sp, gE, gF: 306-96*g8

```
  1 LET HS=0: LET N$=""
  5 GO SUB 3000
 10 FOR f=USR "S" TO USR "0"-1
 20 READ x: POKE f,x: NEXT f
 29 INPUT "DIFFICULTY (1-9)?";D
IF: LET S=0: LET DIF=DIF/100: IF
 DIF>=.1 THEN GO TO 34
 30 LET T=10: LET d=1: LET a=0:
LET w=20
 31 PAPER 4: INK 7: CLS
 32 FOR F=5 TO 20 STEP 4
 33 LET a$="
"
 35 IF F<7 THEN LET A$(2)="
 40 PRINT AT f,0;a$: NEXT f: FO
R f=3 TO 20: PRINT AT f,27;"
": NEXT f
 50 LET p=2: LET h=15
 52 IF p=27 AND INKEY$="0" THEN
 GO SUB 300
 53 IF d=1 AND a=0 THEN LET b$=
"
 54 IF d=1 AND a=1 THEN LET b$=
"
 55 IF d=-1 AND a=1 THEN LET b$
="
 56 IF d=-1 AND a=0 THEN LET b$
="
 57 LET a=a+1: IF a>1 THEN LET
a=0
 60 PRINT AT h,p-1;" " INK
2;AT h+1,p-1;" ";b$;"
 70 IF INKEY$="8" AND P<29 THEN
 LET d=1: LET p=p+1
 75 IF INKEY$="5" AND P>2 THEN
LET d=-1: LET p=p-1
 76 IF INKEY$="" THEN LET d=0
 80 PRINT INK 1;AT w,0;"
": LET
w=w-DIF: IF w<15 THEN LET DIF=DI
F+0.005
 90 IF w<h-1 THEN GO TO 9e3
 95 IF W<6 THEN LET W=6
 100 IF h=3 AND p=2 THEN GO TO 5
00
 110 PRINT AT 0,5;"SC:";S;AT 0,1
2;"HS:";HS;" ";N$
 120 IF H>6 AND T>0 AND A$(p)="
" THEN LET S=S+2: LET T=T-1: PRI
NT AT H+1,P-1;"/": BEEP .0625,0:
 PRINT AT H+1,P-1;" ";AT H,P+2;"
"
 190 GO TO 52
 300 FOR f=1 TO 4
 301 IF a=0 THEN LET b$="
 302 IF a=1 THEN LET b$="
 304 LET a=a+1: IF a>1 THEN LET
a=0
 305 PRINT AT h,p;" "; INK 2;AT
 h+1,p;b$; INK 7;AT h+2,p;"
": BEEP .125,-1: BEEP .125,3: LET h
=h-1: NEXT f
 306 LET W=W-DIF: PRINT INK 1;AT
 W,0;"
"
 307 PRINT AT h+2,p;"
": LET T=
10
 310 GO TO 52
 500 BEEP .25,22: BEEP .125,22:
BEEP .125,17: BEEP .25,14: BEEP
.25,10: BEEP .5,22
 505 IF S>=HS THEN LET HS=S: CLS
 : PRINT "YOU'VE GOT THE BEST SC
ORE !"," INPUT YOU'RE NAME.": IN
PUT N$
 510 CLS : FOR F=1 TO 20: PRINT
">>>>";N$;" WELL DONE<<<<": NEXT F
 520 PRINT AT 20,5;"ANOTHER GO?
(Y/N)": INPUT G$: IF G$="N" THEN
 STOP
 530 GO TO 29
1000 DATA 3,3,12,12,3,1,127,127
1001 DATA 192,192,48,48,192,128,
254,254
1002 DATA 3,3,15,15,48,48,192,19
2
1003 DATA 192,192,192,192,192,19
2,192,192
1004 DATA 3,3,3,3,3,3,3,3
1005 DATA 192,192,240,240,12,12,
3,3
1006 DATA 3,3,63,63,192,192,0,0
1007 DATA 192,192,252,252,3,3,0,
0
1008 DATA 3,3,15,15,48,48,48,48
1009 DATA 192,192,192,192,252,25
2,0,0
1010 DATA 3,3,3,3,63,63,0,0
1011 DATA 192,192,240,240,12,12,
12,12
1012 DATA 48,48,63,63,48,48,63,6
3
1013 DATA 12,12,252,252,12,12,25
2,252
3000 PRINT '''                DEATH RUN
          '''"YOU ARE AT THE B
OTTOM OF A      FLOODING SEWER M
AKING REPAIRS,  WHEN YOU NOTICE
THE WATER LEVEL RISING YOU MUST
GET OUT QUICKLY OR DROWN."
3001 PRINT '''"DONT FORGET TO GET
 YOUR TOOLS!"
3002 PRINT '"    5.....LEFT": PRI
NT "    8....RIGHT": PRINT "    0.
.....UP"
3005 PRINT AT 20,3;"HIT A KEY...
": PAUSE 0: CLS : RETURN
9000 PRINT " YOU DROWNED  "
9005 BEEP .5,-12: BEEP .5,-12: B
EEP .25,-7: PAUSE 1: BEEP .75,-1
2: BEEP .5,-7: BEEP .25,-9: BEEP
.5,-12
9010 GO TO 520
```

PONTOON

```
    1 LET S=NOT PI
    2 LET M=NOT PI
    5 PRINT " (g5)YOU(g8)"
   10 LET C$="ace  TWO  THREEFOUR
 FIVE SIX  SEVENEIGHTNINE TEN  J
ack queenking "
   20 GOSUB VAL "200"
   30 LET S=VAL "S"+VAL "C"
   35 IF VAL "S">VAL "21" THEN PR
INT ">BUST<";Q
   40 GOTO VAL "40"+(VAL "-20" AN
D INKEY$="1")+(VAL "60" AND INKE
Y$="0")
  100 PRINT
  105 PRINT " (g5)ME(g8)"
  110 GOSUB VAL "200"
  120 LET M=VAL "M"+VAL "C"
  130 IF VAL "M">VAL "21" THEN PR
INT ">BUST<";Q
  140 IF VAL "M">=VAL "17" THEN G
OTO VAL "300"
  150 GOTO VAL "110"
  200 LET C=INT (RND*VAL "13")
  210 LET P=VAL "C"*VAL "5"+SGN P
I
  220 PRINT " ";C$(VAL "P" TO VAL
 "P"+VAL "4")
  230 IF VAL "C">VAL "9" THEN LET
 C=VAL "9"
  235 LET C=VAL "C"+SGN PI
  240 RETURN
  300 PRINT TAB 11
  310 IF VAL "S">VAL "M" THEN PRI
NT "--YOU WIN--";Q
  320 IF VAL "S"<VAL "M" THEN PRI
NT "++I WIN++";Q
  330 PRINT "XXTIEXX"
```

CARL JOHANSON has managed to fit the game of **Pontoon** into a program for the 1K ZX-81. The game is necessarily very simple; there are no suits, and no five-card tricks. The basics are all there, though, and the game remains enjoyable.

You play the computer who, as banker, always wins in case of a tie. The winner is the player with cards totalling 21, or the nearest lower number. Anyone with cards totalling more than 21 busts and loses the round. You take cards by pressing "1". When you have sufficient cards, press "0" and the computer will select its cards.

Graphics instructions are given in lower-case letters in brackets. "g5" represents graphic 5, and "g8" represents graphic 8.

NOBLEMAN

FOR THIS adventure game, set in mediaeval England, you are transformed into a nobleman. You must struggle to survive in a society where the king rules supreme and falling out of favour can mean ruin, where violence and rebellion are the rule rather than the exception.

You could depose the king and rule the country but you will find that his resources are usually greater than yours and he does not look kindly on rebellious subjects.

All women programmers will be faced with an enforced sex-change, which is difficult to remove without changing large amounts of the program. It is a problem for potential adventure programmers to avoid.

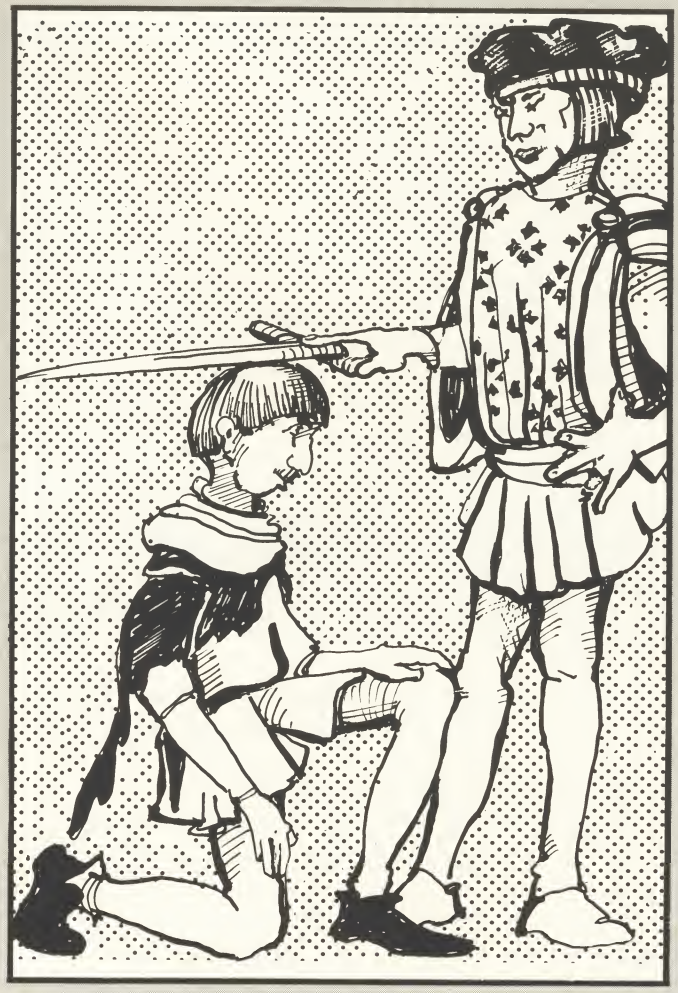
This program was written for the 16K ZX-81 by John Barnes of Swindon, Wiltshire.

```
    2 REM NOBLEMAN
    4 PRINT AT 8,6;"**********
******";AT 9,6;"*
  *";AT 10,6;"* N O B L E M A N
*";AT 11,6;"*                 *"
;AT 12,6;"********************"
    6 FOR X=0 TO 200
    7 NEXT X
    8 CLS
   10 PRINT AT 2,0;"IN THIS GAME
YOU ARE THE HEAD OF A NOBLE FAMI
LY."
   12 PRINT AT 5,0;"IT IS YOUR AI
M TO SURVIVE THE SCHEMING AND PL
OTTING OF THE OTHER NOBLES."
   14 PRINT AT 9,0;"IF POSSIBLE Y
OU ARE TO INCREASE YOUR FAVOUR A
ND STRENGHT POINTS.YOU MIGHT EVE
N BE ABLE TO DEPOSE THE KING."
   16 PRINT AT 14,0;"IF YOUR FAVO
UR POINTS FALL BELOW 0,THE KING
IS LIABLE TO GET ANGRY.IF YOUR S
   18 PRINT AT 21,0;"TYPE ANY KEY
 TO CONT."
   20 IF INKEY$="" THEN GOTO 20
   22 CLS
   30 PRINT "YOUR NAME PLEASE."
   35 INPUT N$
   40 LET T$="SIREARLDUKE"
   45 LET T=RND*10
   50 IF T<=4 THEN LET Z$=T$(1 TO
 3)
   55 IF T>4 AND T<=7 THEN LET Z$
=T$(4 TO 7)
   60 IF T>7 AND T<10 THEN LET Z$
=T$(8 TO 11)
   70 LET A=INT (RND*30)+20
   80 LET M=RND*10
   85 IF M<5 THEN LET M=0
   90 IF M>=5 THEN LET M=1
  100 LET S=INT (RND*4)
  110 LET D=INT (RND*4)
  112 IF M=0 THEN LET D=0
  114 IF M=0 THEN LET S=0
  120 IF Z$="SIR" THEN LET B=4
  130 IF Z$="EARL" THEN LET B=6
  135 IF Z$="DUKE" THEN LET B=8
  140 LET F=10
  150 LET O=0
  160 LET Y=0
  165 GOSUB 500
  170 LET O=O+1
  180 IF O=13 THEN LET Y=Y+1
  185 IF O=13 THEN LET A=A+1
  190 IF O=13 THEN LET O=1
  195 CLS
  220 LET G=INT (RND*100)
  230 IF G>=0 AND G<=24 THEN GOSU
B 700
  240 IF G>=35 AND G<=49 THEN GOS
UB 800
  250 IF G>=50 AND G<=64 THEN GOS
UB 900
  260 IF G>=65 AND G<=69 THEN GOS
UB 1000
  270 IF G>=70 AND G<=74 THEN GOS
UB 1150
  280 IF G>=75 AND G<=79 THEN GOS
UB 1250
  290 IF G>=80 AND G<=89 THEN GOS
UB 1600
  300 IF G>=90 AND G<=99 THEN GOS
UB 1400
  310 IF G>=25 AND G<=34 THEN GOS
UB 1700
  320 IF F<0 THEN GOSUB 2100
  330 IF B<0 THEN GOSUB 2200
  335 GOSUB 500
  340 GOTO 170
  500 CLS
  505 PRINT AT 1,0;"YEAR ";Y;" MO
NTH ";O
```

```
 510 PRINT AT 3,0;"YOU ARE ";Z$;
" ";N$
 520 IF M=1 THEN PRINT AT 5,0;"Y
OU ARE MARRIED."
 525 IF M=0 THEN PRINT AT 5,0;"Y
OU ARE UN-MARRIED."
 530 PRINT AT 7,0;"YOU HAVE ";S;
" SONS AND ";D;" DAUGHTERS."
 540 PRINT AT 9,0;"YOU ARE ";A;"
 YEARS OLD."
 550 PRINT AT 11,0;"YOU HAVE ";B
;" STRENGTH POINTS.";AT 13,0;"YO
U HAVE ";F;" FAVOUR POINTS."
 553 PRINT AT 15,0;"TYPE ANY KEY
 TO CONT."
 556 IF INKEY$="" THEN GOTO 556
 558 CLS
 560 RETURN
 710 PRINT "NOTHING HAPPENED THI
S MONTH."
 720 PRINT AT 5,0;"YOU MAY:DO NO
THING(D),REVOLT(R) OR QUARREL(Q)
."
 725 FOR X=0 TO 1000
 730 IF INKEY$="D" THEN RETURN
 740 IF INKEY$="R" THEN GOSUB 19
00
 750 IF INKEY$="Q" THEN GOSUB 18
00
```

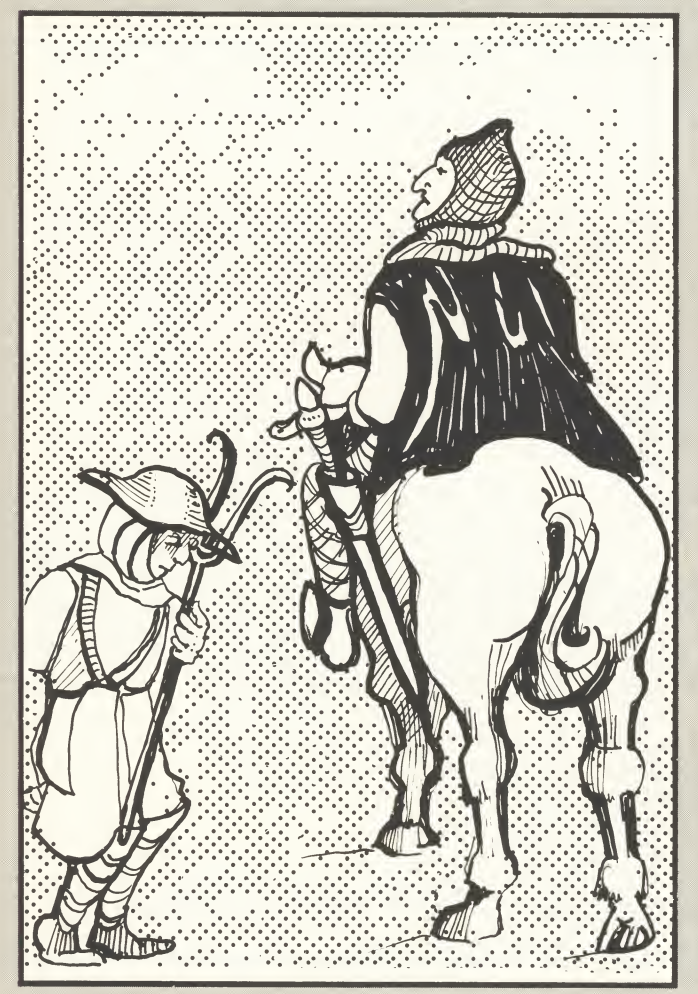
```
 755 NEXT X
 760 RETURN
 800 PRINT "YOU HAVE FALLEN OUT
OF THE KINGS FAVOUR."
 810 PRINT AT 3,0;"YOU MAY:DO NO
THING(D),GIVE KING 1 STRENGTH PT
(G) OR REVOLT(R)."
 812 FOR X=0 TO 1000
 815 IF INKEY$="D" THEN LET F=F-
2
 820 IF INKEY$="G" THEN LET B=B-
1
 824 IF INKEY$="D" OR INKEY$="G"
 THEN RETURN
 825 IF INKEY$="R" THEN GOSUB 19
00
 828 NEXT X
 830 RETURN
 900 PRINT "YOU HAVE FALLEN INTO
 KINGS FAVOUR."
 910 PRINT AT 3,0;"YOU MAY:DO NO
THING(D) OR REVOLT(R)."
 915 LET F=F+2
 918 FOR X=0 TO 1000
 920 IF INKEY$="D" THEN RETURN
 930 IF INKEY$="R" THEN GOSUB 19
00
 935 NEXT X
 940 RETURN
1000 IF M=0 THEN GOSUB 700
1005 IF M=0 THEN RETURN
1010 LET P=INT (RND*10)
1020 IF P>=5 THEN LET S=S+1
1030 IF P<5 THEN LET D=D+1
1040 PRINT "YOUR WIFE HAS GIVEN
BIRTH TO A "
1050 IF P>=5 THEN PRINT AT 3,4;"
SON"
1060 IF P<5 THEN PRINT AT 3,4;"D
AUGHTER"
1070 PRINT AT 5,0;"YOU MAY:DO NO
THING(D),QUARREL(Q) OR REVOLT(R)
."
1075 FOR X=0 TO 1000
1080 IF INKEY$="D" THEN RETURN
1090 IF INKEY$="Q" THEN GOSUB 18
00
1100 IF INKEY$="R" THEN GOSUB 19
00
1105 NEXT X
1110 RETURN
1150 IF M=0 THEN PRINT "YOU HAVE
 GOT MARRIED."
1160 IF M=0 THEN LET M=M+1
1170 GOSUB 720
1180 RETURN
1250 LET H=INT (RND*10)
1260 IF H=4 OR H=8 THEN PRINT "Y
OU HAVE DIED OF THE PLAGUE."
1265 IF H=4 OR H=8 THEN GOSUB 20
00
```

```
1270 IF H=1 AND M=1 OR H=5 AND M
=1 OR H=9 AND M=1 THEN PRINT "YO
UR WIFE HAS DIED OF THE PLAGUE."
1275 IF H=1 AND M=1 OR H=5 AND M
=1 OR H=9 AND M=1 THEN LET M=0
1280 IF H=0 AND S>0 OR H=7 AND S
>0 THEN PRINT "YOUR SON HAS JUST
 DIED OF THE PLAGUE."
1295 IF H=0 AND S>0 OR H=7 AND S
>0 THEN LET S=S-1
1300 IF H=2 AND D>0 OR H=3 AND D
>0 OR H=6 AND D>0 THEN PRINT "YO
UR DAUGHTER HAS JUST DIED OF THE
 PLAGUE."
1305 IF H=2 AND D>0 OR H=3 AND D
>0 OR H=6 AND D>0 THEN LET D=D-1
1310 GOSUB 720
1330 RETURN
1400 LET W$="PEASANT REVOLTWELSH
 REBELLIONSCOTTISH RAID"
1410 LET J=INT (RND*10)
1413 PRINT "YOU HAVE BEEN ASKED
BY THE KING TO SURPRESS A "
1415 IF J=0 OR J=3 OR J=6 OR J=9
 THEN PRINT AT 4,0;W$(1 TO 14)
1420 IF J=1 OR J=4 OR J=7 THEN P
RINT AT 4,0;W$(15 TO 29)
1425 IF J=2 OR J=5 OR J=8 THEN P
RINT AT 4,0;W$(30 TO 42)
1430 PRINT AT 6,0;"YOU MAY:ACCEP
T(A),REFUSE(N) OR REVOLT(R)."
1432 FOR X=0 TO 1000
1435 IF INKEY$="A" THEN GOTO 144
0
1436 IF INKEY$="R" THEN GOSUB 19
00
1437 IF INKEY$="N" THEN GOTO 151
5
1438 NEXT X
1439 RETURN
1440 LET K=INT (RND*10)
1445 IF K=3 OR K=7 THEN PRINT AT
 10,0;"YOU WERE BEATEN.THE KING
ISNT PLEASED."
1448 IF K=3 OR K=7 THEN LET F=F-
2
1500 IF K<>3 AND K<>7 THEN PRINT
 AT 10,0;"YOU WON.THE KING IS PL
EASED."
1505 IF K<>3 AND K<>7 THEN LET F
=F+2
1507 FOR X=0 TO 150
1508 NEXT X
1510 RETURN
```



```
1515 PRINT AT 10,0;"THE KING ISN
T PLEASED."
1520 LET F=F-4
1530 FOR X=0 TO 150
1535 NEXT X
1540 RETURN
1600 FOR X=0 TO 1000
1603 PRINT "ANOTHER NOBLE HAS PI
CKED A QUARREL WITH YOU.DO YOU B
ACK DOWN(B) OR FIGHT(F)."
1605 FOR X=0 TO 1000
1610 IF INKEY$="B" THEN LET F=F+
1
1620 IF INKEY$="F" THEN GOSUB 18
00
1625 NEXT X
1630 RETURN
1700 PRINT "YOU HAVE BEEN ASKED
TO JOIN A REVOLT. ANS YES(Y) OR
NO(N)."
1705 FOR X=0 TO 1000
1710 IF INKEY$="Y" THEN GOSUB 19
00
1715 IF INKEY$="N" THEN RETURN
1718 NEXT X
1720 RETURN
1800 CLS
1805 PRINT AT 3,0;"YOUR FACTION"
,"THEIR FACTION"
1810 LET L=B+INT ((RND*5)*(RND*1
```

```
0))
1815 LET V=INT ((RND*6)*(RND*10)
)
1820 PRINT AT 5,0;L,V
1825 LET U=0
1830 IF L>=1.5*V THEN LET U=1
1835 IF V>=1.5*L THEN LET U=2
1840 IF U=1 THEN LET B=B+3
1845 IF U=1 THEN PRINT AT 10,0;"
YOU WON."
1850 IF U=2 THEN LET B=B-3
1855 IF U=2 THEN PRINT AT 10,0;"
YOU LOST."
1860 IF U=0 THEN PRINT AT 10,0;"
QUARREL UNRESOLVED."
1868 FOR X=0 TO 200
1869 NEXT X
1870 RETURN
1900 CLS
1905 LET F=-1
1910 LET L=B+INT ((RND*5)*(RND*1
0))
1920 LET V=INT ((RND*10)*(RND*10
))
1930 PRINT "YOUR FACTION","KINGS
 FACTION",L,V
1940 IF L>=1.5*V THEN PRINT AT 6
,0;"CONGRATULATIONS,YOU HAVE DEP
OSED THE KING."
1950 IF V>=1.5*L THEN PRINT AT 6
```



```
,0;"HARD LUCK,THE REVOLT WAS CRU
SHED. YOU WERE EXECUTED, AND ALL
 YOUR LANDS WERE TAKEN."
1960 IF L>=1.5*V OR V>=1.5*L THE
N STOP
1970 PRINT AT 6,0;"THE REVOLT PE
TERED OUT."
1975 FOR X=0 TO 200
1978 NEXT X
1980 RETURN
2000 FOR X=0 TO 100
2001 NEXT X
2002~CLS
2005 PRINT "WHAT A PITY, YOU HAV
E JUST DIED."
2010 IF S=0 THEN PRINT AT 3,0;"A
S YOU HAVE NO SON, YOUR LANDS PA
SS OUT OF YOUR FAMILY."
2015 IF S=0 THEN STOP
2020 PRINT AT 3,0;"THE INHERITAN
CE GOES TO YOUR SON.";AT 5,0;"IN
PUT HIS NAME."
2030 INPUT N$
2035 LET A=A-20
2040 LET M=0
2042 LET S=0
2046 LET D=0
2050 RETURN
2100 LET R=INT (RND*10)
2103 CLS
2110 PRINT "THE KING IS ANGRY WI
TH YOU."
2120 IF R=0 OR R=8 THEN PRINT AT
 5,0;"LUCKILY YOU WERE PADONED."
2125 IF R=0 OR R=8 THEN LET F=0
2130 IF R=2 OR R=7 THEN PRINT AT
 5,0;"YOU WERE STRIPPED OF YOUR
LANDS."
2135 IF R=2 OR R=7 THEN LET B=0
2140 IF R=1 OR R>=3 AND R<=6 OR
R=9 THEN GOTO 2150
2142 FOR X=0 TO 150
2143 NEXT X
2145 RETURN
2150 PRINT AT 6,0;"YOU WERE EXEC
UTED AND YOUR LANDS WERE CONFISC
ATED."
2160 STOP
2200 CLS
2205 PRINT "WHAT A PITY, YOU ARE
 IN DEBT.ALL YOUR TITLES ARE STR
IPPED AWAY AND YOU BECOME A COMM
ONER."
2210 STOP
```

TUG O' WAR

A GAME for two players simulates a **Tug o' War.** You and your opponent each choose a key — either "p" or "q" — and its corresponding team. If you press your button while the light at the top of the screen is green, your team will gain ground, but if you press it while the light is red it will lose ground. Score is kept at the bottom of the screen.

The program was written for the 16K Spectrum by S A Fisk of Bridgend, Mid-Glamorgan.

Graphic notes:
35 Inverse graphic 1, graphic 7
50 4*graphic C, 10*graphic A, 4*graphic D

```
  10 INK 0: BORDER 0: PAPER 6: C
LS
  12 FOR n=USR "a" TO USR "a"+31
: READ d: POKE n,d: NEXT n
  13 DATA 0,0,0,254,0,0,0,0
  14 DATA 0,0,0,126,0,0,0,0
  15 DATA 192,d,128,-1,240,112,2
8,7
  16 DATA 3,d,1,-1,15,14,56,224
  20 PLOT 119,168: DRAW 17,0: DR
AW 0,-9: DRAW -17,0: DRAW 0,9
  25 PRINT PAPER 2;AT 1,15;"  "
  30 PLOT 0,153: DRAW 255,0
  31 PLOT 0,152: DRAW 255,0
  35 FOR n=8 TO 14: PRINT AT n,1
5;"▙▜"
  40 NEXT n
  45 LET sx=0: LET sy=0
  50 LET a$="                    "
  60 PRINT AT 20,2;sx;TAB 13;"SC
ORE";TAB 29;sy
  70 LET z=6
  80 PRINT AT 11,z;a$
 120 FOR c=5 TO 0 STEP -1: PRINT
 AT 0,0;c;AT 0,31;c: PAUSE 20: N
EXT c
 130 PRINT AT 11,z;a$
 140 IF z>10 OR z<2 THEN GO TO 2
10
 150 LET c=2+2*(RND>.6)
 160 PRINT PAPER c;AT 1,15;"  "
 170 LET x=IN 64510: LET y=IN 57
342
 180 IF x<>190 AND y<>190 THEN G
O TO 170-20*(RND<.1)
 190 LET z=z+(x=190 AND c=2)+(y=
190 AND c=4)-(x=190 AND c=4)-(y=
190 AND c=2)
 200 GO TO 130
 210 LET sx=sx+(z<2): LET sy=sy+
(z>10)
 215 FOR j=1 TO 10: PRINT AT 11,
z+1;"####################": PAUSE
5: PRINT AT 11,z+1;"##############
######": PAUSE 5: NEXT j
 225 PRINT AT 20,2;sx;AT 20,29;s
y
 230 PRINT AT 11,1;"  Press any
key to re-start  "
 240 PAUSE 0
 245 PRINT AT 11,3;"
                  "
 250 GO TO 70
```

© SOFTWARE
SUPER CHESS II
For Sinclair 48K SPECTRUM

THE BEST AT £7·95
Guaranteed able to consistently beat Sargon II and all other Spectrum chess programs !!

:Six levels of play : Plays a variety of openings e.g. French Defense, Sicilian Defense, Ruy Lupez, Queen's Gambit etc
:Self Play Mode : Analyse Mode : Enhanced end-game play : Recommended move option

© SOFTWARE Spectrum software

●● ORIGINAL SUPERCHESS ●● The Cheapest

10 levels of play: recommended move option: substantial 'opening book' e.g. French Defense, Queen's Gambit, Ruy Lopez etc: Self play feature: analyse mode.
49k Spectrum £4.95 **16k ZX81 £4.95**

●● BACKGAMMON ●●

Play this fascinating game of skill and chance. High resolution colour display with dice roll. Can be used by expert players and also has documentation to enable beginners to learn the game.
48k Spectrum £5.95

●● ZX DRAUGHTS ●●

With its 10 levels of play, ZX Draughts is the ideal game for the beginner or expert player. **48k Spectrum £6.95**

●● SPECTRUM FORTH ●● NEW!!

FORTH – 10 times faster than Basic, much easier than machine code. If you want to discover the advantages of Forth or are already converted, Spectrum FORTH is the ideal package. The package is cassette based and includes Spectrum Forth, a sample Forth program and comprehensive user documentation. It has all Forth structures and allows full use of the Spectrum's colour, hi-res, graphics.
Specify 16k or 48k when ordering.
16k version, about 115 new words can be defined **16k Spectrum £9.95**
48k version, about 1200 new words can be defined **48k Spectrum £9.95**

●● SPECTRUM SPEECH ●●

Yes it's possible! Software driven speech from the Spectrum. Simple to use in your own programs. Each cassette comes with user documentation and demonstration program. No extra hardware is required. Uses Spectrum speaker and top 32k Ram.
SOFTALK I: 'Multiwords' 70 plus words, numbers zero to million, plus, go, limit, right, great etc ..... **48k Spectrum £6.95**
SOFTALK II: 'Spacegames' 80 plus words, numbers, red alert, torpedoes, phasors, bearing south etc ..... **48k Spectrum £6.95**

●● SPECTRUM BRIDGE TUTOR ●● NEW!!

Improve your Bridge with the Spectrum Bridge Tutor. Uses the Acol bidding system including Blackwood and Stagman conventions. Each of the 40 hands illustrates a particular point(s) in the bidding and play. After playing a hand you are given an explanation of the main points of the bidding and play. The correct bid and play must be made to progress but if you need assistance there is a help feature.
For 16k and 48k Spectrum **Beginners (40 hands) £5.95** **Advanced (40 hands) £5.95**

Also available from:
Buffer Microshop – Streatham, London
Philip Capley – Ossett, West Yorks
Georges – Bristol
Screen Scene – Cheltenham
WH Smith – Computer Branches
ZEDXTRA – Kinsen, Bournemouth
Computers – Wigmore Street, London
Capital Cameras – Crawley

UK Prices include post & packing. Despatch within 48 hours (For orders outside UK add 80p for postage). Send cheque or postal order to:
CP SOFTWARE, Dept. 2su, 17 Orchard Lane, Prestwood, Bucks. HP16 0NN

PROGRAMMERS – TOP RATES PAID FOR QUALITY SPECTRUM PROGRAMS
SEND YOUR MATERIAL FOR EVALUATION AND PROMPT REPLY

MIKROGEN

MAD MARTHA
For 48K SPECTRUM

Poor little Henry is the hen-pecked hero of this domestic tale.
One night Henry can take no more. He steals his wages from his wife's purse, sneaks out of the house being careful not to wake the baby or trip over the cat, and heads for the bright lights to have some fun. Trouble is he runs out of money. His only way to raise some cash is to gamble his few remaining pounds on the spinning wheel of the roulette table.
Just as Henry is getting into his evening at the tables his wife — Mad Martha — has noticed his absence. Realising Henry has absconded with the housekeeping she sets out after him with an axe.
Guess what part you play in this happy tale? That's right, you're Henry. Watch out for that axe!

** Accepts full English sentences **
** Draws each location in hi-res **
** Save game feature **
** Hundreds of witty replies **
** Includes three Arcade type games * * as part of the Adventure **

Access or Visa Card holders please telephone (0344) 27317 (9am–6pm)

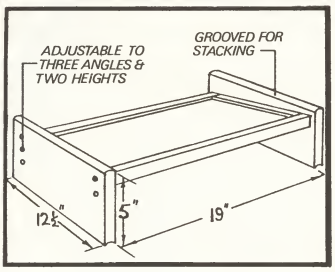
Please add 40p per order for post & packing

Name _____

Address _____

Mikrogen, Dept MM1, 24 Agar Crescent, Bracknell, Berkshire, RG12 2BK

£6.95



MicroBase. Fits your computer into your home. With style.

MicroBase. Crafted in solid mahogany, hand polished and superb quality. Complete with fitted nylon dustcover to suit TV's with up to 14" screens. MicroBase suits most computers - Sinclair, BBC, Atom, VIC, Oric, Dragon, Lynx, etc., plus room for accessories. Price £20, postage £2, VAT included.

To Order...
please send your payment to:
Peter Furlong Products, Unit 5s, South Coast Road Ind. Estate, Peacehaven, E.Sussex BN9 8NA. Tel. (07914) 81637. ACCESS, VISA.
Please state make of computer.

Dealers...
MicroBase will enhance your displays and your profits. Check out our special offer.
Custom display units supplied.

HILTON COMPUTER SERVICES LIMITED

The renowned PERSONAL BANKING SYSTEM is now available for
ZX81 ☐ ZX SPECTRUM ☐ DRAGON 32

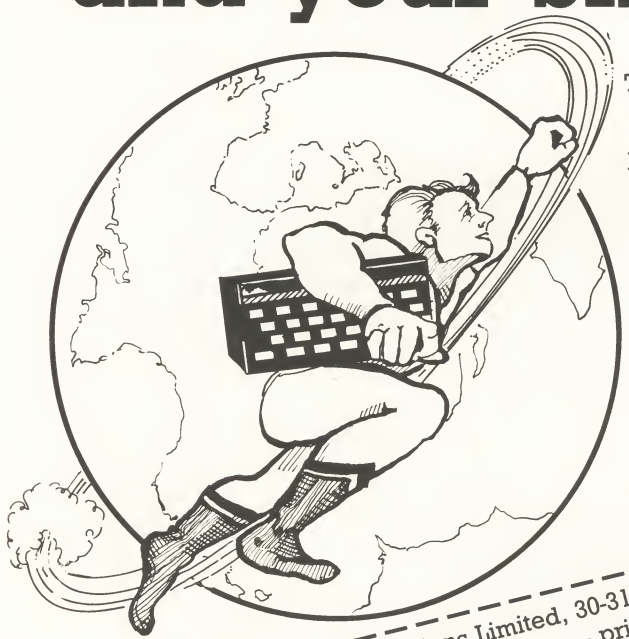
Maintain permanent recores and fully detailed statements of your finances including:
- ALL cheque book transactions and bank receipts.
- ALL standing order payments.

AUTOMATICALLY PROCESSED (monthly, quarterly, six-monthly or annually AND for set number of payments).
In addition the ability to search, locate, delete or correct previous entries. List by category facility is included.
Additional BANK RECONCILIATION module available to automatically match your Bank Statement to your PERSONAL BANKING SYSTEM account.
Full instructions and GUARANTEED after sales maintenance provided.
PBS ZX81 £8.95 (16K) ☐ ZX SPECTRUM £9.95 (48K) ☐ DRAGON £9.95 (32K)
REC (for use with above) £5.00
Ask for the PBS at your local computer store, or ORDER (specifying for which machine) by POST from

Hilton Computer Services Limited Dept (YC)
14 Avalon Road, Orpington, Kent BR6 9AX. OR at the POST OFFICE using TRANSCASH ACCOUNT 302 9557

*** YOUR PBS IS NEVER OUT OF DATE ***

A world of activity for you and your Sinclair



Whether you have a ZX80, ZX81 or Spectrum — we can show you there's far more to your Sinclair than you ever thought possible. That's the *active, lively* world of **Sinclair User** — the first magazine written specially for everyone who owns or uses a Sinclair computer.

Every month, there is a whole range of games, business ideas and bright new ways to learn. There is the Sinclair User Club, with special exclusive member offers. There are technical facts, development news and advice, plus hints from other users and answers to queries — in fact everything you need to be an interested, informed and ACTIVE Sinclair user.

There's just one problem — **Sinclair User** sells out fast! So make sure you don't miss your copy: order it today from your newsagent — or complete the subscription form below and we will send it to you direct, every month.

Mail to: ECC Publications Limited, 30-31 Islington Green, London N1 8BJ Yes — I'd like to subscribe to Sinclair User (12 issues — price £11.00 including P&P) I enclose a cheque for £_____
Please charge my credit card: Card name _____ Number _____
Name _____ Address _____
Signature _____ Date _____
NB This offer applies to UK subscribers only. Overseas rates available on request.

SPECTRUM 48K SPECTRUM 48K

VELNOR'S LAIR

THE MOST REALISTIC ADVENTURE YET

The Black Wizard Velnor has gone into hiding in the Goblin Labyrinth of Mt. Elk. The reason is now plainly clear, after centuries of searching he has finally discovered the ancient tomb of Grako and is now about to realise his ghastly ambition to become a true demon on earth! Time is too short to mass an Army aganist Velnor. There is only one hope for mankind. That one brave adventurer may be able to penetrate Velnor's defences, defeating his guards, avioding the traps and surprising Velnor before the metamorphosis is complete. You are that chosen person, but beware, not only does Velnor employ the most ghastly of creatures as guards, he is also a master of illusion.

In this D & D stye adventure you may be a Wizard, Warrior, or Priest, as a Warrior you are best suited to battle, but how will you cope with the fiendish spells of Velnor? As a Wizard your spells are devastating, but beware, your magic is limited and armed combat doesn't come easy! As a Priest you may protect yourself with the devine powers and you have no fear of the undead, but how will you handle the ghastly Trolls?

The adventure will require ingenuity and careful planning. Combat takes the form of D & D style scenarids where instant death is rare but, beware, wounds are cumulative and stratergy is of the utmost importance.

Only £6-50 inc. p + p

Cheques or P. O. to:

NEPTUNE COMPUTING **(Dept. SU2)**

98, Howe Street,

Gateshead, Tyne & Wear NE8 3PP

Your ZX supplier on the continent:

The English Computer Shop

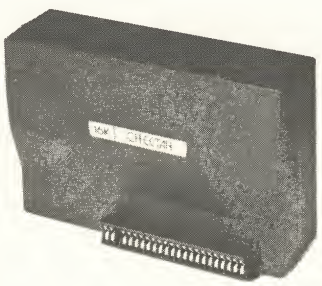
Most of the good things advertised in this journal can be seen, tried and purchased in our specialised shop. Open Tuesday to Saturday, 9.30 till 12.30 and 13.30 till 17.30. Mail Order also possible — ask for our catalogue.

The English Computer Shop,
Zilversmidsstraat 2, B-2000
Antwerpen Belgium.
Tel: 03 233 59 06.

The Cheapest Known Rampacks In The World

★ 16K RAMPACK **£19.75** ★

★ 64K RAMPACK **£44.75** ★



Fully compatible with ZX81 and all accessories. Simply plug straight into user port at rear of computer.

- LOW COST—EXCEPTIONAL ELECTRONICS
- FULL CASED TESTED AND GUARANTEED
- GOLD PLATED EDGE CONNECTOR COATED FOR EXTRA LONG LIFE
- SECURE NO WOBBLE DESIGN
- SAME SLEEK CASE SIZE FOR BOTH VERSIONS

PRICE INCLUDES VAT and P & P

Delivery normally 14 days

Send Cheque/P.O. Payable to:

CHEETAH Marketing Ltd.
359 The Strand, London, WC2 Telephone: 01-240 7939 Telex: 8954958

CHEETAH Marketing Ltd.
359 The Strand, London, WC2 Telephone: 01-240 7939 Telex: 8954958

Please Supply ..... Cheque enclosed for £.....

NAME ..... ADDRESS .....

.....

SU5

Push your Sinclair to the limit

ZX81/SPECTRUM ARCADE GAMES

NEW **ZX INVASION FORCE** (ZX81)
Use your skill to fire through the energy band to destroy the menacing alien ship — **£3.95**

NEW **SPEC INVADERS**
SPEC GOBBLEMAN
These exciting high-speed classic games incorporate hi-resolution graphics and sound to bring you the best in arcade action at only **£4.95** each (16/48K)

NEW **SPEC FROG 5/SHOWDOWN** (16/48K)
Hop across the dangerous road avoiding the lethal cars, then lorries. Go back to the wild west for a gunfight battle amongst cacti and wagons. Features include western music. **£4.95**

NEW **NAMTIR RAIDERS** (ZX81)
High speed, quick action arcade game with four separate groups of attackers. **£3.95**

Gobbleman also available for ZX81 at **£3.95**

UTILITIES

NEW **TOOLKIT**
Nine powerful new functions for your ZX81 (including re-number lines (goto, gosub), program merge, string finding and replacement. **£5.95**

SPEC BUG
A 30 in 1 machine code tool and disassembler for your ZX Spectrum. **£6.95**

ZX BUG
A 30 in 1 machine code tool and disassembler for your ZX81. **£6.95**

Improve your machine code programs with this new 48K Spectrum Assembler

Just released by Artic, this new professional quality assembler is also available for 16K ZX81 and features:—

* Word-processor-like text editor. * High-speed, versatile two-pass mnemonic assembler with labels and detailed error-trapping. Will assemble to any address. * Essential support facilities such as memory-edit, register inspect/modify and search for de-bugging. * Full output to ZX-printer. * Memory-status report and comprehensive user-manual. ONLY £9.95

ZX81 & SPECTRUM

NEW LOW PRICE ADVENTURE GAMES

ONLY £5.95 for ZX81 and £6.95 for SPECTRUM

INCA CURSE (Adventure B)
In a jungle clearing you come across an ancient Inca temple. Your mission to enter, collect the treasure and escape alive. But beware! Includes a cassette save routine.

SHIP OF DOOM (Adventure C)
You are unavoidably drawn to an alien cruiser. Can you reach the control room and free yourself? Or will they get you first? Includes a cassette save routine.

ESPIONAGE ISLAND (Adventure D)
While on a reconnaisance mission your plane loses control and you are forced to land. Can you survive and escape with the island's hidden secret?

PLANET OF DEATH (Adventure A) 16/48K
You find yourself stranded on an inhabited alien planet. Can you reach your ship and escape?

also available for SPECTRUM

ZX FORTH
Supplied on cassette with editor cassette, user manuals and keyboard overlay. ZX Forth combines the simplicity of basic with the speed of machine code now £14.95

THE ULTIMATE ADVENTURE FOR THE SPECTRUM/ZX81 for only £9.95

AND THE CHANCE TO WIN £10,000 or more IF YOU KRAKIT™

RULES AVAILABLE FROM ARTIC

KRAKIT TRADE MARK OF INT. PUBLISHING & SOFTWARE INC.

Your eccentric father has left you £10,000 in his will. In order to claim your windfall you must solve twelve clues and gain access to a bank account in which the money has actually been deposited. Be the first to crack the puzzle and the prize is yours! Plus you will win two tickets to the city of the secret KRAKIT™ vault location. The Prize money is increased weekly. A telephone number will be supplied so you have the opportunity to find out just how much you could win.

DON'T MISS YOUR CHANCE TO WIN A FORTUNE!

SPECTRUM MICRO CHESS

The only Chess program for a 16K or 48K Spectrum. Allows all legal moves, castelling; en-passant and pawn promotion.
Options to play black/or white. Sets board in any position. Full colour and graphics display.
ONLY **£6.95**

new releases for 16K & 48K SPECTRUM

SPECTRUM INVASION FORCE

A popular arcade game for 16K or 48K Spectrum. Fires through the force field to destroy the menacing alien ship. Sounds easy?? Two levels of play — normal or suicidal. Full colour. Sound and hi-res. graphics.
NOW ONLY **£4.95**

A GREAT CHESS GAME FOR YOUR ZX81 OR SPECTRUM*

*SPECTRUM CHESS 48K

ZX CHESS I
Very popular machine code program, with six levels of play and an analysis option. Available for ZX81. **£6.50**

ZX CHESS II
A new improved version, with a faster response time, seven levels of play, analysis option and in addition a recommended move option. **£9.95**

ZX 1K CHESS
An incredible game in 1K for only **£2.95**
As featured on ITV

NEW **SPECTRUM VOICE CHESS**
This incredible program talks you through your game.
It tells you its move, recommends a move, and contains a range of facetious comments. The game is based on the highly successful ZX Chess II and is offered at the Christmas offer price of £9.95.

SPECTRUM CHESS now only **£9.45**

ALWAYS AHEAD WITH ZX81/SPECTRUM SOFTWARE

Cheques & P.O. made payable to: Artic Computing Limited. Dealer enquiries welcome.
Please state whether your order is for ZX81 or Spectrum. Send S.A.E. (6in × 9in) for catalogue.

VISA We welcome Access

ARTIC COMPUTING LTD.
396 JAMES RECKITT AVENUE, HULL, N. HUMBERSIDE,

To: Artic Computing Ltd., 396 James Reckitt Avenue, Hull, N. Humberside, HU8 0JA.

Please supply.....

.....

.....

Cheque for total amount enclosed.

Name.....

Address.....

.....

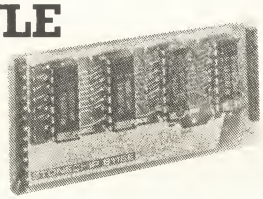
SU 4

SPECTRUM AND ZX81 HARDWARE

PANDA

The famous Panda Expandable Ram Pack. Massive 16K add-on memory which can easily be expanded to 32K with an optional plug-in module. Supplied in rugged no-wobble design, rugged, injection moulded case, contoured to fit the ZX81 snuggly. Compatible with other add-ons (printer etc). LED on/off indicator. No additional power needed just plug in an go. British designed and made from top quality components throughout, guaranteed 12 months. **ONLY £24·50**

EXPANSION MODULE



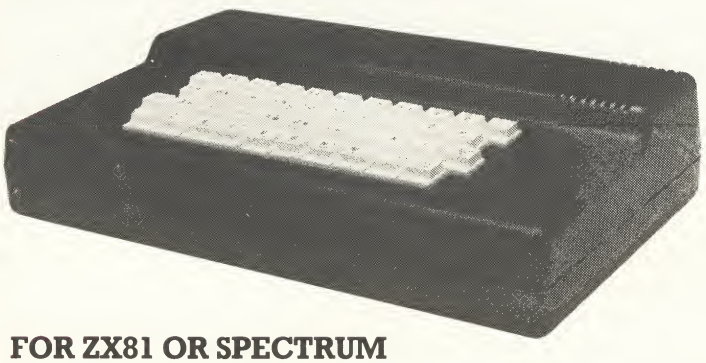
The 16K 'Panda' is easily expanded from 16K to 32K by adding this expansion module as and when you need it.

ONLY £20·00

GIANT PANDA

Giant Panda the two together. Buy the Panda and the Expansion Module at the same time for a gigantic 32K bytes and save.
Complete at a special price of **ONLY £40·00**

PROFESSIONAL CASED KEYBOARD TYPE FD42



FOR ZX81 OR SPECTRUM

This famous, best selling product immediately converts your ZX Computer into a sturdy, attractive and professional unit, with full size typewriter keyboard. A tough plastic case encloses the keyboard, PCB and power supply. It has 42 keys including all the ZX81/Spectrum graphic characters printed on them. The full travel key switches have gold plated contacts and guaranteed life of 10^6 operations. It's so easy to install! You simply unscrew the ZX PCB from its case, screw it to the FD case, and plug in the keyboard. No soldering or technical knowledge required. **ONLY £29·00**

TYPE FDS FOR ZX81 OR SPECTRUM

Our new advanced keyboard has the same, fine specifications as the FD42 system, but with a new re-designed case, space bar and double-sized shift and enter keys. A must for the discerning ZX81 or Spectrum user. **ONLY £39·95**

ZX KLIK – KEYBOARD

If, like many ZX81 users, you are fed up with the dead feel of the touch sensitive keypad then consider the well tried 'Klik-Keyboard'. This is a simply fitted genuine push button keyboard which has been designed as an exact replacement for, and is no larger than, the existing keypad. ■ Fits on to the ZX81. ■ Full 40 keys plus one spare for any purpose. ■ No soldering – just plug in. ■ No trailing wires. ■ Clear permanent two colour legends. ■ Positive feel and sound as data is entered. ■ Speeds up programming enormously and reduces errors. ■ Fitting service offered £2·00 extra (remember to send your ZX81). **ONLY £24·50**

THE SOUND EXPANDER

A superb economical addition to your ZX Spectrum. Clear, dynamic sound effects will really enhance your enjoyment of the new exciting programs available for the Spectrum. Our new sound amplifier comes complete with leads, volume control and built-in loudspeaker. Simply plug into the mic input, it fits neatly on to the back of the Spectrum. **ONLY £7·50**

STOP PRESS

16K Spectrum owners – upgrade to 48K with a Spectrum Upgrade Pack complete with full instructions. No soldering. **ONLY £35·00**

COMING SOON!

Our range of products is constantly under development and review. We have selected products from leading manufacturers in the UK and believe these represent the best value and quality combination on the market today.

PRODUCTS ARE STOCKED AND USUALLY DESPATCHED WITHIN 10 DAYS.

I wish to order the following:

Quantity	Item	Amount
	Panda @ £24·50 inc.	
	Expansion Module @ £20·00 inc.	
	Giant Panda @ £40·00 inc.	
	FD 42 Keyboard ZX/Spectrum* @ £29·00 inc.	
	FDS Keyboard ZX/Spectrum* @ £39·95 inc.	
	ZX Klik-Keyboard @ £26·50 inc.	
	Sound Expander @ £7·50 inc.	
	Spectrum Upgrade Pack @ £35·00 inc.	
	TOTAL	

All prices include VAT and post and packaging. All items include a full year guarantee. Products are stocked and usually despatched within 10 days. Overseas customers add £4 post and packing. Cheques/Postal Orders etc. should be made payable to AFDEC Electronics Ltd.

Card No. _____

Signature _____ Access DINERS CLUB INTERNATIONAL

Name _____

Address _____

SU5

AFDEC ELECTRONICS LTD 318 Kempshott Lane Basingstoke Hants RG22 5LT

Our second User of the Month discovered how to transmit programs over his CB radio. Claudia Cooke talks to Alan Howell about his growing interest in Sinclair computers.

Spectrum finds a good buddy

ALAN HOWELL sat in his West London home staring at his television screen in amazement. What he saw was not unusual, since it was a games program he had used many times previously on his Spectrum. This time the tape was in a friend's home and Howell had just received the program via CB radio.

"I was absolutely staggered", says 23-year-old Howell. "I have had CB radio for about a year and I was using it to talk to a friend one evening when suddenly he said we should have a game on our Spectrums.

"We were both joking but he transmitted it and there it was on the screen. He just did not believe me until he had played a few moves and I had responded. It was amazing; I was intrigued".

Since that evening, just before Christmas, Howell and his friend have followed their astonishing discovery with a host of programs over the air, including the time Howell was able to write a birthday greeting to appear on a friend's television screen.

Their discovery has opened a world of new possibilities for Howell and his CB friends, including the fact that programs can be shared simultaneously with as many people as can hear them.

Being a somewhat more experienced Spectrum user than some of his friends, Howell is often asked to collect a friend's tape and iron-out the problems. Now he can do that without even leaving home — and tapes can be shared and borrowed in the same manner.

How is it done? Instead of plugging the Spectrum into the tape recorder, you plug it into the CB amplifier, which is able to relay the signal instead of the tape recorder.

Having done that, Howell found that it was impossible to hear what the other person was saying. He overcame the difficulty by using an external speaker and amplifier. The cassette recorder he uses for saving programs has a built-in amplifier, so it is possible to hear what is being recorded. All he had to do was to connect the MIC socket of the Spectrum to the cassette recorder in the usual manner for saving programs and the sound emerged from CB clearly.

All that remained was to type-in, load and press enter, with fingers crossed for good measure.

The joy of the operation is that it does not need a computer genius. In fact, when Howell bought his first personal computer two years ago, a ZX-81, his knowledge of computers was so minimal that he says:

"I wanted a really good calculator and that is what I thought I was buying. I admit when I first took it home and realised it was a computer I was really annoyed; I thought it was a total waste of money. Then I read the manual, just for interest, and within two or three hours I was writing a program".

> 'I wanted a really good calculator and that is what I thought I was buying. I admit when I first took it home and realised it was a computer I was really annoyed'.

Since that day, he has written numerous programs and has swapped his ZX-81 for a Spectrum, which he loves.

Having spent four years studying hotel management, Howell became ill six weeks after taking his first job and he has been unemployed since then but the time has been well spent. He decided to take a correspondence course in accountancy and says:

"I was writing programs for equations and for doing my accounts and the computer really helped me. I am hopeless at studying on my own but when you have a computer it becomes more of a game — it becomes fun".

When he decided to buy a CB radio set, he again admits total ignorance of what he was starting.

"I knew nothing about it, except that I thought you had to have all this sophisticated lingo or no-one would understand you. I was really surprised to hear people talking normally. Being ill for so long, the CB and the Spectrum have really helped me to keep my sanity. With the CB I have made a group of new friends".

In addition to his new-found technical skills, Howell is a member of the elite Magic Circle, having been a dedicated magician since the age of six.

"I gave my first public performance when I was 12, for the Scouts. Then I started to receive a number of bookings and I joined the Magic Circle when I was 18. I do not do it for money any

more but I still do it for my friends — you know, cutting them in half and that kind of thing".

Not content with such a bizarre range of activities, he is also a talented amateur musician, playing the organ, piano, guitar, piano accordion and the harpsichord.

He has played the organ at his local church, St. Paul's in Hounslow West, for the last seven years and owns his own organ, guitar and piano accordion. He admits:

"I have never been so busy in my life. I seem to have less time to myself now than ever before and I am never bored".

His enthusiasm for computers is now so great that, having sailed through his hotel management training and assumed that would be his career, he has now done an about-turn in favour of learning to be a computer programmer.

"I realise that my knowledge is amateur but I plan to go back to college and study computers seriously and get a job in that field afterwards. I find the world of computers completely absorbing; they have the potential to affect almost everything we do and programming them would be a real challenge".

Howell is also keen to persuade other Sinclair users to invest in a CB radio set — he says it will cost less than £50 — and discover the fascination of using it to transmit programs.

He has made several improvements to his initial discovery in the last few weeks. One is that the sender of the program should plug a speaker into the MIC socket and keep the CB microphone as close to it as possible. That allows the recipient to control the volume output from CB to Spectrum.

He recommends beginning with short programs — about 10 or 20 lines — to minimise the chance of outside interruptions which would prevent your program loading.

The radius of a CB set is three miles, so anyone who has a set and intercedes will blot-out the signal you are trying to receive. Although it is not normally the best time of day for settling down to a computer game, Howell recommends the early hours of the morning, since it is quieter then and you are more likely to succeed with a longer program.

Another tip to avoid having to rewind the tape each time the program is not being received well is to add the following two lines to the end of a program:

9998 SAVE 'program name'
9999 GOTO 9998

Howell reckons the whole operation should also be possible with a ZX-81, although he has not put it to the test. So any Sinclair user with £50 to spare should be able to join the fun.

When he had a ZX-81, he says he rarely bought programs for it, preferring to write his own and not to look on it simply as a vehicle for games. He points out that even two years ago there were far fewer programs available in far fewer shops than there are today.

"I do not think it was such a bad thing when there were fewer programs. It meant you had to experiment and write a few yourself.

"Nowadays if someone has bought a few programs and then decides to write his own, it is bound to be far less professional. He is likely to be discouraged quickly because he knows that really good programs are available in the local shops".

Since buying a Spectrum, he admits he has found some of the games irresistable, especially The Hobbit, and he has tended to write fewer programs.

His only criticism of the Spectrum is its limitations on sound. Being a musician, he says the beep of the Spectrum cannot create many true notes — but with three musical instruments at home, it is not something which worries him unduly.

Howell is keen to start a club in his area for owners of Spectrums and CB sets and he suggests it as a good idea for any Sinclair users with CB sets who have like-minded friends living near them.

> 'I have never been so busy in my life. I am never bored'

Altogether, with his music, magic, cookery and computers, his is a busy life, in spite of the fact that he is unemployed. Once he has qualified as a computer programmer, it looks as if his will be a name to watch.

J.K. GREYE ENTERPRISES LTD

... is a new company, from J.K. Greye, set up specifically to bring you High Quality/Low Cost games for your Sinclair ZX Computers.

THE **ARCADIAN**

4 Games plus Menu

for the 16/48k SINCLAIR ZX SPECTRUM

only **£4.95** incl.

Includes

Invasion · Kamikaze

Minefield · UFO

Games as sold elsewhere for £5+ each, why pay more for less, when you can get all four for the price of one!

The **ARCADIAN** includes games to suit all ages, from 5 to 105

INVASION: Our version of the Classic Arcade Game, surely one of the best around. Includes Full Colour High Res. Graphics, Sound and it's incredibly fast at the end.

KAMIKAZE: If you like Scramble, you'll love this. 16 levels (long ones at that), of tortuously twisting caverns, Missiles, Starmines (which move in between games, so it's never the same next time around), Bases, Fuel Dumps (watch you don't run out of fuel!), and two speeds (difficult and impossible). Definitely a game for those amongst you with a suicidal tendency, when playing games, because you can score even when you crash! (If you can make it past level 8, write and let us know, 'cause that's as far as we've managed!).

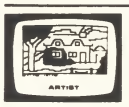
MINEFIELD: A totally new game, in which you have to lay mines in a forest. Sounds simple doesn't it? But, once you start, you can't stop and there lies the rub (or to be more exact the explosion!). Guaranteed to get your fingers in a twist!

UFO: Dodge the Asteroids, blast the Alien Craft and work off your aggressive instincts on the keyboard. Gets progressively more difficult the longer you last!

All of these for only £4.95, can you afford to miss out on this one!

ZX81 GAMESTAPES as previously sold by J.K.Greye Software ltd.

GAMESTAPE 1 for 1K _____ **only £3.95**
10 Games incl. ASTEROIDS, UFO, CODE, BOMBER, GUILLOTINE, KALIEDESCOPE, etc.
PROBABLY THE BEST VALUE 1k TAPE AVAILABLE.
We've done in 1k, games which some of our competitors require 16k to do!



GAMESTAPE 2 for 16K _____ **only £3.95**
★ **STARFIGHTER** Superb machine code Space Battle, Set against a background of twinkling stars, with stunning explosions — if you can hit the enemy!
PYRAMID Can you move the Pyramid? Make a mistake and it will collapse! A thinkers game.
ARTIST The ultimate Graphic Designers aid. 8 Directions, 10 Memories, SAVE, COPY, RUBOUT, CLS, etc.

GAMESTAPE 3 for 16K _____ **only £4.95**
★ **CATACOMBS** A Multi-Level Graphics Adventure. Each level can contain up to 9 Rooms, 8 Passages, 7 Monsters, Food, Gold, Traps, Phantoms, an Exit (to the next level), and there's an infinite number of levels.
NOTE .....This is NOT one of the necessarily limited text Adventures as sold elsewhere.
"An excellent addictive game which will keep you amused for hours".....COMPUTERS & VIDEO GAMES.

Send your order to: **J.K.GREYE ENTERPRISES LTD. 16 Park St. Bath BA1 2TE**

Please tick boxes of required tapes.

The ARCADIAN at £4.95 ☐
GAMESTAPE 1 at £3.95 ☐
GAMESTAPE 2 at £3.95 ☐
GAMESTAPE 3 at £4.95 ☐

All Software sold subject to the condition that Hiring, Lending, Unauthorised Copying or Resale is Strictly Prohibited

Name .....

Address .....

..... Postcode .....

I enclose a cheque/P.O. for £.....
made payable to **J.K. GREYE ENTERPRISES LTD.**

TRADE & EXPORT ENQUIRIES WELCOME

PROGRAMMERS! Do you think you can write brilliant games Software for the spectrum? If so, contact us and we'll market it for you. if you don't think your games are the best around, try the other Software Houses, because we will only sell the best!

If you prefer to see before buying, our range of Gamestapes are stocked by W.H.Smith, John Menzies and good computer stores Nationwide

CHILDREN'S EDUCATIONAL SOFTWARE

(The Micro Master Series for SPECTRUM and ZX81)

A series of educational programmes for children aged 6-13 years.

All the programmes have been RESEARCHED AND TESTED by teachers. They are easy to use (just RUN) and they have been designed with just one aim in mind — fast and efficient learning. each programme requires 16K or more.

THE FOUR RULES OF NUMBER. *(A package of 5 programmes)*

Virtually all mathematics requires use of the FOUR RULES of number. Knowing how to use them (add, subtract, multiply and divide) is NOT ENOUGH. Children must learn to be FAST AND ACCURATE as well as learn to cope with more complex arithmetic. They must also learn their tables WELL. Only in this way can a child even BEGIN to deal effectively with mathematics.

The FOUR RULES package has been designed to achieve these goals QUICKLY. It will cater for an average 6 year old as well as for the best 11 year old aiming for a VERY HIGH STANDARD. Each programme will adjust to the child's ability and keep him reaching upward. Grading tables show the parent where the child stands for his age and ability.

LANGUAGE DEVELOPMENT SERIES *(For 7-13 year olds)*

Teach/test programmes which will develop VOCABULARY, SPELLING, CONCEPT ATTAINMENT, VERBAL REASONING and KNOWLEDGE OF THE ENGLISH LANGUAGE.

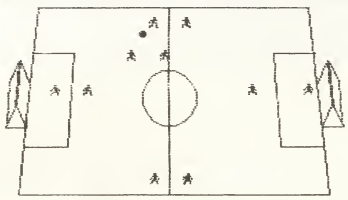
These programmes are specific to EACH age group, and for EACH age group there is a SERIES of carefully graded cassettes. For example, for a 9 year old there are cassettes 9A, 9B, 9C . . . 9H (progressing in difficulty from A to H). Each cassette contains 10 programmes and every programme requires 16K. Performance is monitored to determine whether or not the child should move to a higher level.

THE FOUR RULES PACKAGE	£7.60 (£11.70 after June 1 1983)
LANGUAGE DEVELOPMENT CASSETTE	£6.20 (£7.90 after July 1 1983)

Cheques to Dr K. Glasson for CES, 94 Airedale Ave, Chiswick, London W4 2NN. For further details phone 01-747 1373 (Answer Phone for your address)

(SINCLAIR & COMMODORE PROGRAMMERS REQUIRED)

ZX SPECTRUM
16K and 48K
NEW FOOTBALL AND TENNIS



Picture from the Football Game

New action sports games feature a 3D view of the game. In both games you play one side. The computer plays the other side and is fast and hard to beat. Different skill levels.

FOOTBALL
Each player can move, shoot etc independently, includes fouls (if players collide), corners etc. Scale 90 minutes play. Any team names can be used. Price £5.50.

TENNIS
Each key plays a different stroke. All Tennis rules used. Plays 3 sets. Proper scoring and serving. Animated figures. Price £5.50.

TANK BATTLE
3D view from tank turret of woods, villages, attacking tanks etc. 360 degree turrett movement. Price £4.50.

SPACE FIGHTER
Pilots eye view of space, attack aliens, refuel in flight etc. Price £4.50.

PINBALL
Flippers, flashing lights etc. Price £3.95.

DESTROYER
Planes and submarines attack your ship. Defend with guns and depth charges. Price £3.95.

CAR RACE
You drive one car, the computer the other, control with steering and brakes. 2 circuits. Price £3.95.

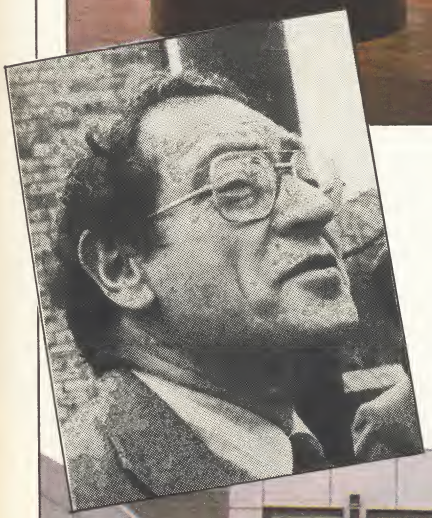
Also **SUPER INVADERS** and **MAZE MUNCHER** £3.95 each
Buy any 4 games get any game free
Please add 35p post and packing per order

Winters Ltd, 24 Swannington Close, Cantley, Doncaster, S York, DN4 6VA.

PEEPING from behind rows of terraced houses near the centre of Cambridge is the Sinclair Research ultra-modern new computer centre.

The architect, Cristoph Grillet, pictured left, of Lyster, Grillet and Harding, is said to have combined Cambridge traditions with major innovations in architectural design, interior furnishing and environmental control systems.

One of the ducts for the system can be seen in the picture on the immediate left above the office which overlooks the entrance hall. The hall is dominated by the sculpture, shown far left, Double Torso II by Helaine Blumenfeld.



Stainless Sinclair

dk'tronics

ZX KEYBOARD FOR USE WITH 80/81 SPECTRUM

Our new cased keyboard has 52 keys, 12 of these are used for the numeric pad. The numeric pad offers some useful features, you can cursor with one hand and it will be a boon for anyone who enters a lot of numeric data. The pad is a repeat of the 1-9 keys plus it has a full stop and a shift key. The numeric pad keys are coloured in red, the normal keyboard keys are grey, with the case being black which makes the whole thing very attractive. The case measures 15 × 9 × 2½. The computer (either 80/81 or spectrum) fits neatly inside. You will have to remove the computer from its original case, it is then screwed to the base of the case. The case had all the bosses already fitted and the screw holes are marked. Also fitted inside the case is a mother board (81 model only) which allows 16K, 32K and 64K to be fitted in the case. All the connections are at the rear of the case i.e. Power, Mic, Ear, T.V. and the expansion port. The case is large enough for other add ons also to be fitted inside. One of these could be the power supply, then you could very quickly fit a mains switch, or a switch on the 9V line. This means you have a very smart self-contained unit. This case does not stop you from using any other add-ons that you may have e.g. Printer etc. We are convinced that this is the best keyboard available at present. It offers more keys and features than any other keyboard in its price range.

£45

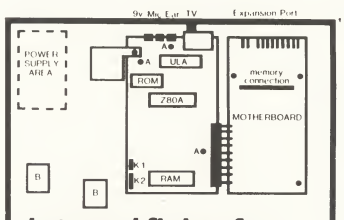
KEYBOARD (SPECTRUM/81)

NOTE

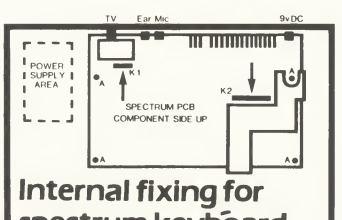
The case can be purchased separately with the keyboard aperture uncut, so if you have one of our early uncased keyboards, or in fact any other suppliers' keyboards, these could be fitted. The keyboard is connected to your computer by a ribbon cable and this has connectors fitted which simply push into the Sinclair connectors. It is a simple two minute job and requires no electronic skills. This keyboard does not need any soldering. Please specify on order whether you require the ZX 81 or Spectrum case.

SPECTRUM MODEL

This is supplied with spectrum legends, and a slightly different base for fitting the spectrum inside, again all the connectors are at the rear of the case and there is plenty of room for the power supply (and other add-ons). Should you want to change, we can supply both the Spectrum legends and details of updating your case which will enable modification from the ZX 81 to spectrum. PLEASE specify on your order whether you require the ZX 81 or spectrum case.



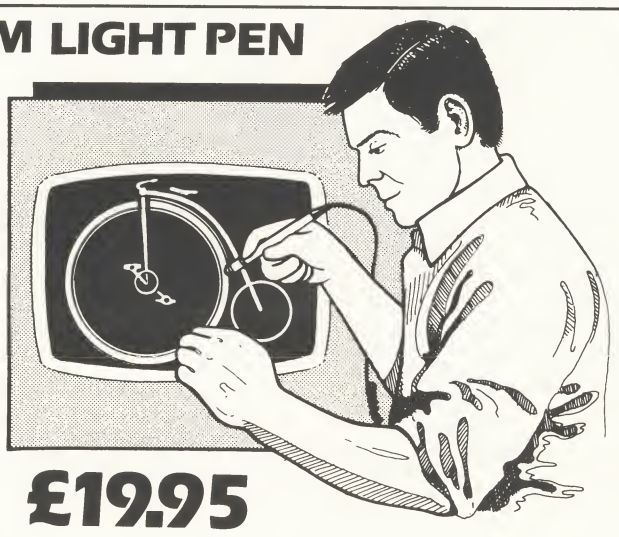
Internal fixing for ZX 81 keyboard case.



Internal fixing for spectrum keyboard case.

SPECTRUM LIGHT PEN

The pen enables you to produce high resolution drawings on your own television set, saving a vast amount of time over using basic programming statements, such as Plot, Draw etc. You can erase, modify and save drawings and it comes complete with software program. The superb light pen is available from D.K. tronics.



£19.95

SPECTRUM

16K Memory Expansion

The 16K uses 41[illegible] Dynamic Static Ram and occupy [illegible] using the Static Ram. This speed low power Rams. the computer. A the [illegible] which comes to you full where. Position in memory.

64K Memory Expansion

All the above information advantage lies in the 64K of usable memory. the use of other add-ons 8192-65536. The Block F

Spectrum Memory Ex

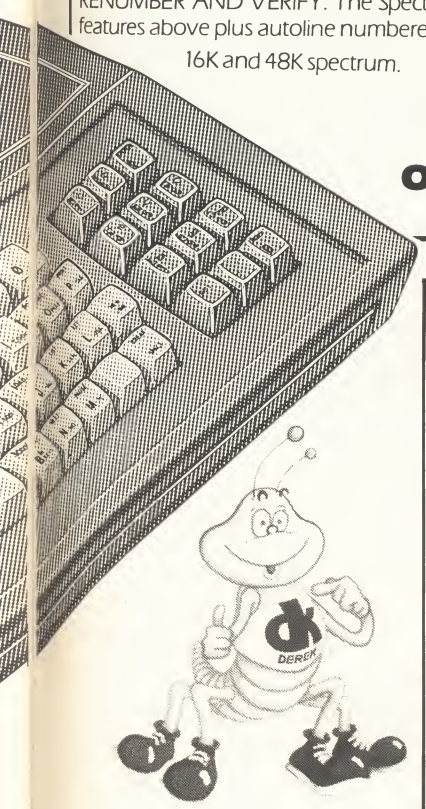
Upgrade your Spectrum it is simply slipped inside are supplied, and the on time. The fitting requires same as Sinclair's upgrad

ZX 80~81 Spectrum HARDWARE

SPECTRUM/81 TOOLKIT

This is the toolkit which won acclaim in the feature in the August 1982 issue (pages 29 and 30) of Sinclair User. "It is the most impressive program, fast in execution with clear and full instructions...it stands out from the rest of the field." The ZXED is a powerful editor for use on the expanded ZX81. It is intended for use by the serious BASIC programmer and offers several useful and time saving features most helpful during all stages of program development. The facilities provided are as follows: ALTER, BYTES, COPY, DELETE, FIND, HELP, INSERT, KEEP, MOVE, RENUMBER AND VERIFY. The Spectrum Toolkit contains most of the features above plus autoline numberer and append, and will run in the 16K and 48K spectrum.

Both at only £6.95



4K GRAPHICS ROM £24.95

The DK Graphic module is our latest ZX 81 accessory. This module unlike most other accessories fits neatly inside your computer under the keyboard. The module comes ready built, fully tested and complete with a 4K graphic ROM. This will give you an unbelievable 448 extra pre-programmed graphics, your normal graphic set contains only 64. This means that you now have 512 graphics and with their inverse 1024. This now turns the 81 into a very powerful computer with a graphic set rarely found on larger more expensive machines. In the ROM are lower case letters, bombs, bullets, rockets, tanks, a complete set of invaders graphics and that only accounts for about 50 of them, there are still about 400 left (that may give you an idea as to the scope of the new ROM). However, the module does not finish there, it also has a spare holder on the board which will accept a further 4K of ROM/RAM. This holder can be fitted with a 1K/2K/RAM and can be used for user definable graphics so you can create your own custom character sets.

WHY WAIT?
ORDER TODAY FOR FAST DELIVERY

FLEXIBLE RIBBON CONNECTOR

If you have ever had whiteouts or system crashes this could be the answer. It stops the movement between the computer and the RAM expansion, it is supplied with a ribbon, 6 inches long, with a male connector at one end and a female at the other, at only

£10

16/64 MEMORY FOR ZX 81

16K Memory £22.95
16K (uncased) £19.95
64K Memory £52.95
64K (uncased) £49.95

The above illustration shows the casing for the 16K or massive 64K.

UM MEMORY

pansion £22.95

Dynamic Ram Chips. We use the dynamic as they are much denser than cupy less space. They are also much cheaper than the equivalent product im. The Ram is manufactured with high quality materials, and uses high Rams. It is supplied ready-built and only needs to be plugged into the rear of the components are fitted into holders. This massive add-on memory ou fully assembled and tested is the cheapest 16K memory available any- memory from 16384 to 32768. (Same as the Sinclair memory.)

16K (UNCASED) £19.95

pansion £52.95

rmation on the 16K also applies to the 64K Memory Expansion, but the he 64K giving nearly FOUR times the memory. This advanced model has nory. In addition, the block from 8K to 16K can be switched out to enable dd-ons. The graphics ROM is to be used in this area. Position in Memory: lock From 8192-16384 is switchable.

64K (UNCASED) £49.95

ry Expansion £35.00

ctrum to 48K of user Ram. The Spectrum memory expansion is simple to fit, inside the case, and then only requires plugging in. Full fitting instructions he only tool you will need is a screwdriver and just two minutes of your quires no electronic skills. Position in memory from 32768 to 65536. (The pgrade to 48K).

Please state type of machine, which Rom memory size, quantity and place when ordering.

Please send me . . . . . @ £ . . . . .

Please send me . . . . . @ £ . . . . .

Please send me . . . . . @ £ . . . . .

Please add on £1.25 for P/P

In enclose cheque/P.O. payable to DK Tronics total £ . . . . .

or debit my Access/Barclaycard ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Signature . . . . . BARCLAYCARD VISA

Name . . . . . .

Address . . . . . .

. . . . . .

Send to DK Tronics, Unit 2, Shire Hill Ind. Est., Saffron Walden, Essex CB11 3AQ
Tel: (0799) 22359/26350

dk'tronics

New colour brochure now available, send SAE for quick return

TERROR-DAKTIL 4D

In a place forgotten by time, the beating of wings heralds an incarnation too horrifying to believe – Terror Daktil 4D. A game so terrifyingly real that you'll need all your courage just to remain at your 48K Spectrum screen. As the dreaded prehistoric monsters swoop down, intent on your destruction, a battered pistol and marksmanship are your only defence.
You must fight for your life and as the sun sets, your chances of survival begin to slip away. For at night, you'll only see the gleam of their eyes!
Terror Daktil 4D – a game beyond your wildest dreams; not just 3-dimensional graphics reaching out of Spectrum to engulf you, but also the 4th dimension of time that turns day into menacing night at an alarming rate.
Unbelievable thrills await those brave enough to enter the lost world of Terror Daktil 4D.

Two more super 48K Spectrum programs;
PENETRATOR "...immensely playable, yet very difficult and horribly addictive." – **Computer & Video Games.**

THE HOBBIT "The Hobbit is far superior to any other adventure game available for the Spectrum" – **Your Computer**
"A game by which future games will be judged." – **P.C.T.**

MELBOURNE HOUSE PUBLISHERS

Melbourne House Publishers
Orders to: 131 Trafalgar Road, Greenwich, London SE 10
Correspondence to: Glebe Cottage, Station Road, Cheddington, Leighton Buzzard, BEDS LU7 7NA.

SU5

Please send me your **free** Catalogue.
☐ Please send me:
☐ Terror Daktil 4D – 48K Spectrum cassette – £6.95
☐ The Hobbit package – 48K Spectrum cassette, full colour instruction manual and Hobbit book – £14.95
☐ Penetrator – 48K state-of-the-art arcade game – £6.95
Please add 80p for post & pack.) I enclose cheque/money order
£ ..... or debit my Access card No. .....
Expiry date .....
Signature .....
Name .....
Address .....
Postcode .....
Access orders on 24-hour ansaphone
(01) 858 7379

John Gilbert reviews a possible competitor

Oric stakes its claim to the Spectrum market

THE ORIC ONE has been proclaimed by its manufacturer as the machine of the future. In the same breath it says that it is a machine which was designed to run in direct competition with the Spectrum.

The machine is impressive in many respects but its general performance during bench-testing was less so. Oric is manufactured in two versions. The first, and most inexpensive, is the 16K model. If, however, you want to do serious work with the machine it is a good idea to buy the 48K version, as Oric Products International does not plan to upgrade customers' 16K machines.

At the launch, the price of the Oric was set below that of the Spectrum and the specifications far exceed those of the Sinclair machine. The keyboard is bigger and more robust than that of the Spectrum but the keys are just as difficult to operate.

There are several output ports accessible through the back of the machine. The cassette interface uses a three-pin DIN socket for communication with an ordinary cassette player. The cassette interface will work at 300 baud for slow but reliable operation or at 2,400 baud for fast but less reliable saving and loading. The cassette interface works well but is not as accurate as the Spectrum output.

Next to the cassette port is the RGB — red, green, blue — monitor interface. It will allow you to plug a monitor straight into the back of the system with no other pieces of equipment added.

Also included in the range of ports is a Centronics interface for a printer and an output bus from which joysticks or external ROMs can be run. That set-up is more durable than that of the Spectrum but we could not make the Centronics interface work with a Seikosha printer, as the Oric always crashed.

The initial power-up of the machine can pose problems to a beginner to computing. The Oric will often produce very spectacular crash displays before it decides to settle down for the introductory frame to be displayed.

When the power is switched on, the computer will display the number of bytes available through the system. Initially there are 47,870 bytes but when programming starts the user will have access to only 40K of memory.

Unlike the Spectrum, the Oric has two main modes which allow memory to be used for text — program and data — or for high-resolution screen display. On the hi-res screen alphanumeric characters can be displayed only using string slicing and conversion of strings to their ASCII code values. It is therefore difficult to mix text and graphics if you are a beginner.

The Oric allows full re-definition of the character set. The alternative character set can be switched on through the Basic command LORES and the normal set can be switched back using the same command.

Oric International has implemented MicroSoft Basic on its new system. That version of the language seems to be an industry standard at present. The Oric implementation of it is certainly more powerful than Sinclair enhanced Basic. Most of the commands on the Oric can be mimiced on the Spectrum but the Oric also allows the user to write extended Basic subroutines, which will be implemented by defining new Basic commands. It is, therefore, possible to create your own extentions to the Basic language.

One extention which could be made in the language is the addition of Basic statements which would handle file input and output. On the Oric you have to save the variables area to save files but on the Spectrum you use LOAD DATA. This is not ideal for beginners who know little about memory maps and machine code.

The Oric One compares well to the Spectrum but there are several difficult areas. One is the manual; the booklets are being despatched with amendment sheets. In the first versions of the manual, some of the programs would not run as listed.

The author of the manual also seems to have devoted too much space to machine code programming on the 6502 processor. That space could be better-used by explaining the Basic language a little more coherently. At the moment the manual does not do justice to the machine.

> 'The Oric has been seen as a threat to the Spectrum. That may be true in the long run but at present there is a dearth of software'

The Oric has been seen as a threat to the Spectrum. That may be true in the long run but at present there is a dearth of software for the machine. The Spectrum has a tremendous software and hardware backing. It also has the name of Sinclair on it. At the moment Sinclair seems to have nothing to worry about but if Oric produces the promised peripherals in time, Sinclair could well have a fight on his hands.

Crystal

Innovative ZX Software

Have you the skill and reflexes to control a leviathan space freighter from lift-off to touch-down?

Have you the business head to trade successfully throughout the length and breadth of an entire planet?

Find out by becoming a

MERCHANT OF VENUS

where a complex economic scenario is combined with a superb graphic simulation to produce an entirely new concept in real time adventures.

By studying the current market and wheeling and dealing in Cyborgs, Robodrones and much more, you must plan your business strategy.

But ultimately your success depends on your ability as a pilot; from lift-off as you thrust skyward . . . during flight as you control your ship's flight over mountains, cities and oceans . . . to landing where your descent is displayed in incredible graphic detail.

A compelling game of skill and strategy for the 16K ZX-81. **£5.95**

ZX-81 1K GAMES PACK: Without doubt the finest quality collection for the **1K ZX-81**:- 4 full screen, fast action graphics games, all with on-screen scoring: Invaders, Astravoid, Bomber and Super Slalom, plus a challenging adventure, Dungeon Quest.

All 100% machine-code. Great value at £4.95

COSMIC GUERILLA: This classic arcade game is now available for the ZX Spectrum. Written in 100% machine code, with fast super-smooth colour graphics and sound. You must defend your laser bases against incessant attack by those marauding aliens. For 16K and 48K Spectrums **£5.95**

THE DUNGEON MASTER: Dungeons and Dragons fans . . . let the 48K Spectrum be your D.M. with the first adventure program to enter into the true spirit of D&D. Its unique dungeon creation program allows you to create your own complex scenarios quickly and simply. Comes complete with sample dungeon. Battle your way through a new dimension in fantasy. An infinity of possibilities for only **£6.95**

Open up a whole new world of programming with our professional standard machine code utilities. Send for details (including printer samples).

S.A.E. for our latest catalogue. Please add £0.50p p&p and make Cheques/P.O.s etc, payable to:

CRYSTAL COMPUTING
2 Ashton Way, East Herrington,
SUNDERLAND SR3 3RX

Dealer enquiries welcome. Written any software? Send it to us for evaluation and details of our excellent royalties scheme.

NEWSOFT PRODUCTS

16K SOFTWARE FOR SINCLAIR ZX81 AND SPECTRUM

3D SPECTRAL MAZE

Fast action. 3D maze. Superb plot and draw routines. Make this specially commissioned program one that you must see.
SPECTRUM ONLY

SECRET VALLEY

A complex role-playing adventure with great graphics and full sound effects!
ZX81 OR SPECTRUM

TIME BANDITS

Two programs for the price of one! Side A has five fast action games. Practice them now before running Side B or you will not survive long in this magical adventure.

"Perhaps the most original of the new graphic adventure games (Eric Deeson, Your Computer, November).
ZX81 OR SPECTRUM

THE GREAT WESTERN

Arcade Adventure in the Wild West. Shoot the Moose, hunt the gold or fight the Indians. You have to be fast to survive the journey.
ZX81 OR SPECTRUM

ROULETTE

The Original Microcomputer Roulette. The only program to allow all legal bets within 16K. Excellent graphics. Can be used to test any system!
ZX81 OR SPECTRUM

The Black Dwarfs Lair

An impossible chase through the underground tunnels of the Black Dwarfs Caverns. Virtually unbeatable. Try it if you dare.
SPECTRUM ONLY

Cassettes £4.95 each — £8.00 for any two.
Please specify which version required — ZX81 or Spectrum

NEWSOFT PRODUCTS
12 WHITE BROOM ROAD, WARNERS END
HEMEL HEMPSTEAD, HERTS, HP1 3PU

BARGAIN-HUNTERS READ *THIS!*

Whatever your model of Sinclair computer—you can get HOURS of fun, intellectual satisfaction and education for just 95p per month!

A bargain?
That's **Sinclair Programs** magazine—the fat, glossy magazine that's PACKED with original, tested programs for you to load and run.

With **Sinclair Programs** every month you can build the library of programs that suits your mood: in recent issues we have challenged our readers with programs to test their skill at Sharpsnooter or Laser Cannon . . . jolt their brain cells with Quadratic Equation or Monster Maths . . . or take a practical turn with their own word processor program or graphic generator.

That is just a fraction of what you get from **Sinclair Programs**. Each month we have 40 programs for owners of ZX80s, ZX81s and Spectrums. But make sure you don't have to hunt TOO far for your bargains—**Sinclair Programs** always sells out quickly, so order yours TODAY from your newsagent, or fill in the form below and we will send it direct to you, every month.

Mail to: ECC Publications Limited, 30-31 Islington Green, London N1 8BJ Yes — I'd like to subscribe to **Sinclair Programs** (12 issues — price £13.20) I enclose a cheque for £ ____ Please charge my credit card Card: name ____ Number ____ Address ____ Name ____ Date ____ Signature ____

NB This offer applies to UK subscribers only. Overseas rates available on request.

BUSINESS USERS

SPECTRUM 48K

Preparation of Accounts from Incomplete Records—An upgraded version of the popular ZX81 Accounts which is being used by many accountants and small businessmen. Produces Prime Entry Listings, Nominal Ledger, Trial Balance, Profit and Loss Account and Balance Sheet with supporting schedules. 73 nominal ledger accounts and automatic VAT calculations.

Sole Trader/Partnership (Up to 4)	£25.00
Limited Company	£25.00
(Combined Price £35.00)	

Sales and Purchase Ledgers coming shortly.

ZX81 16K

Preparation of Accounts from Incomplete Records—
31 nominal ledger accounts

Sole Trader	£17.50
Limited Company	£17.50
(Combined Price £25.00)	

Sales and Purchase Ledgers—
Produces day book, sales/purchase and VAT analyses, debtors/creditors listings, statements.
50 accounts and 200 monthly transactions.

Sales	£20.00
Purchases	£20.00
(Combined Price £25.00)	
Mailing List	£3.00

Handles up to 90 names and addresses.

All programs are supplied on cassette with operating instructions.

Full details:

HESTACREST LIMITED
P.O. Box 19, Leighton Buzzard, Beds. LU7 0DG
Tel. 052-523 785.

THE TOMB OF DRACULA!

3D HORROR ADVENTURE GAME!

For the **16K ZX81** or with colour and sound for the **48K SPECTRUM,** a superb 3D graphics adventure game! **Enter** Dracula's tomb at 30 minutes to sunset . . . **wander** through the tomb's pre-mapped 300 vaults in search of the fabled Vampire's Treasure . . . **pick up** valuable silver stakes and use them to defend yourself against the lurking horrors . . . ghouls, zombies, pits of primaeval slime . . . **See** them all on the computer's plan of the tomb . . . when it will let you! **Take** a chance on a Mystery Vault . . . if you dare! And all the time the minutes are ticking by to sunset . . . when **Dracula** rises from his coffin and comes after **you!** Each of the infinite levels of the tomb has its own 300 vaults . . . go as deep as you like, the Prince of Darkness will seek you out in his blood-lust! **WARNING: people of an exceptionally nervous disposition should play this game only during the hours of daylight!** Special facility lets you save a game in progress onto tape so you can continue it whenever you choose.

For ZX81 with 16K RAM £3.95
For 48K SPECTRUM £4.95

Price includes ready-to-load cassette with library case and inlay, full instructions, postage and packing. **Order today!** Money refunded if not delighted!

Send cash, P.O. or cheque to:

FELIX SOFTWARE (DEPT. SU10)
(incorporating MOVIEDROME VIDEO)
19 Leighton Avenue, Pinner, HA5 3BW.

The affordable FORTH

FORTH	: A full implementation of this very fast running language. Ideal for writing fast moving arcade type games. Allows the full colour and sound facilities of the Spectrum to be used. Future Microdrive enhancements will be made available. 48K Spectrum only.		14.95
Chess 1.4	: 10 Levels m/c. Graphic screen display. 16K ZX81 only.		8.95
Invaders	: Very fast m/c action. Includes mystery ship and increasingly difficult screens. 16K ZX81 only.		4.45
Mazeman	: A fast action m/c game that reproduces the spirit of the original. The Spectrum version includes excellent graphics and sound. 16K ZX81 & 16/48K Spectrum.	ZX81 4.45	4.95
Adventure 1	: Based on the original game by Crowther, this game was the start of the Adventure craze. Reviewed Sinclair User.Iss.2. Features Save game routine as the game can literally take months to complete. 16K ZX81 & 48K Spectrum.	ZX81 8.95	9.95

ABERSOFT
7 MAES AFALLEN, BOW ST, DYFED, SY24 5BA

24-hour Ansafone for Access orders on (0970) 828851

Use your computer in the case...
Foam rubber gives complete protection...
Purpose-built for ZX systems...

Spectrum and ZX81 Custom Cases.

Just £34·95 (+P&P) each.

Turn your ZX system into a portable computing centre!

Your ZX hardware – ZX81 or Spectrum – is designed to work together as a system.

And now there's a simple way to make the most of the fact.

The portable computing centre in a briefcase.

A ZX Custom Case holds all your hardware in the most ergonomically sensible positions for easy operation. Each piece of equipment is gripped securely by shock-absorbing foam. Each connecting lead fits under the foam, so there's no chance of tangles. And as each piece is held firmly, connections are excellent.

You can forget wasted time setting up or unhooking the system, too. When you've finished, simply tuck in the mains and TV leads and replace the hinged, lift-off lid. And of course, if you're taking your ZX system to college or the office, ZX Custom Cases are a lot less cumbersome than a bag or rucksack. And a lot more protective and professional.

Designed by ZX enthusiasts – for ZX enthusiasts.

Both the Spectrum and ZX81 Custom Cases were designed by a group of ZX system users and manufactured by Britain's leading case makers. Made from impact-resistant ABS, each case holds every piece of Sinclair hardware available for the respective computers – plus Learning Lab, manual, software cassettes and any cassette player up to 10½" x 5½". If you haven't all the hardware, simply leave the pre-cut foam in position, then remove it as you get extra pieces of equipment.

And when brand new hardware is introduced, or you upgrade from ZX81 to Spectrum, simply contact us for a replacement foam insert for just £4.95 (+p&p).

ZX81 Custom Case also available!

Send for your ZX Custom Case – now!

Spectrum and ZX81 Custom Cases are guaranteed for two years, and cost just £34.95 (+p&p) each. Remember you could pay more for an ordinary briefcase.

To order, simply use the FREEPOST coupon. Or if you have a credit card, telephone 0276 62155, Mon-Fri, 9.30-5.30.

COMPUTEX CASES

Computex Cases (JBS), Stanhope Road, Camberley, Surrey, GU15 3PS.

Please allow 28 days for delivery. 14-day money-back undertaking.

To: Computex Cases (JBS), FREEPOST, Camberley, Surrey, GU15 3BR.

Please send me _____ (qty) Spectrum Custom Case(s) at £36.95 (inc. £2.00 post, packing, insurance) each. **02.**

Please send me _____ (qty) ZX81 Custom Case(s) at £36.95 (inc. £2.00 post, packing, insurance) each. **01.**

*I enclose a cheque/P.O. for £_____ made payable to Computex Cases.

Please debit my Access/Visa* account no. _____

*Please delete as appropriate. PLEASE PRINT.

Signature _____

Name: Mr/Mrs/Miss _____

Address _____

_____

_____

Reg. in England no: 991288. SUS 305

John Gilbert completes his five-part series on how to write your own programs in Basic by showing how to find and correct errors

Clearing system bugs

IN THE FINAL article of the series I want to take you back to show you how a program is constructed in a series of numbered steps. To begin, however, I want to discuss errors which can occur in programs, commonly called bugs, and how to rid yourself of them.

Much has been written about bugs. The term is derived from the early days of computing when only large mainframe computers existed. They had to be, and still are, kept in specially protected areas where dust or insects could not enter the machinery. If computers were not kept clean and serviced they could often crash and data and programs could be lost.

Most of the bugs encountered by programmers occur because program structure is incorrect. The statements causing the crashes are usually the FOR . . . THEN and GOTO lines.

When a program crashes, look at the report code shown on the bottom of the screen and find the line number where the computer ceased the RUN. If you have been following the series you should know that a GOTO effect should be limited to one routine. If an error occurs at a certain line you have to look at that routine.

On some computers the system offers a command which prints-out the line number to which the computer goes during operation. It is called the TRace ON (TRON) routine. It can be simulated on a Spectrum if you wish to add an extra instruction to each of the troublesome lines. That instruction will make the computer print-out each line number as it is executed.

It is not important that you know how it works but for those who are interested the PPC system variable is PEEKed and the current line number returned from the two addresses accessed by the statement. The instruction to be appended to program lines is:
PRINT PEEK 23621+256*PEEK (23621+1)

That instruction can be put anywhere any number of times. It is best to append it to the end of lines.

It is also possible to chart the course of FOR . . . NEXT loops. It is done by printing the variable used in the loop. The print statement should be put at the end of the FOR . . . statement and not at the end of the NEXT statement. If you do the latter the count printed will be incorrect. Both techniques are illustrated in diagram A — for GOTOs and — B for FOR . . . NEXT.

The two techniques can be incorporated together in a program and, with the error message you get when the program crashes you should be able to locate and correct the error.

When talking about these techniques and correcting errors, I must stress again that they will be of help only if you have used the structuring techniques which have been explained throughout this series.

I have detailed the pathway to structured programming, as explained in these articles, as a series of structured steps:

First: Decide what type of program you want and what you want it to do. It is best to write it as a series of statements in plain English.

Second: Decide how you are to handle the task and whether it can be done with your machine and with the level of experience you have.

Third: Break the task into a series of headings and sub-headings. For example, most programs need some form of instructive display — an entry procedure, a calculation procedure and an output procedure. They must be tailored to meet your needs.

Fourth: Draw a flowchart. That should take a long time in many cases. It is good idea to draw several charts, expanding the most important boxes in the main one. In that way you will know the concepts of the program before you begin coding. If flowcharting does nothing else it will concentrate your mind on what you want to do.

I have a word of warning to people who have taken flowcharting to their hearts. The technique is a means to an end and is not an end in itself. If you think a certain number of charts is necessary, draw them, but do not draw charts for the sake of doing so because you will often be confused as a result.

Fifth: Coding the program. The code, in this case using the Sinclair Basic language, should be laid out in separate modules. The control module should be put at the top, as it is the part of the program which will be used most. Each module should be complete and GOTO statements should be local to a module if possible.

Sixth: In long programs bugs, or errors, are liable to occur frequently. Bugs occur usually in the data entry parts of the program and in the flow structure. Flowcharting and structured programming will not dispose of all bugs but it will eliminate a few.

If you have followed the series you should be able to write reasonably complicated programs. As I have stressed, there are two factors which are important, more so than some of the others, which are necessary to make programming easier and more enjoyable.

The first is structure. If your program is well-structured it will contain fewer bugs and will, in most cases, run faster. The second point is that the program must be designed for ease of use, so that it can be used by someone who knows nothing about computers.

If you have taken my advice, or even modified it using your own techniques, you are on the way to being an efficient programmer. You will find that you can do more and programming will become less of a difficult task and more rewarding.

Diagram A

```
  10 PRINT : PRINT PEEK 23621+25
6*PEEK (23621+1)
  20 PRINT PEEK 23621+2556*PEEK
(23621+1): GO TO 10
```

Diagram B

```
10 FOR k=1 TO 10: PRINT k
20 PRINT
30 NEXT k
```

Sinclair ZX Spectr

16K or 48K RAM... full-size moving-key keyboard... colour and sound... high-resolution graphics...

From only £125!

First, there was the world-beating Sinclair ZX80. The first personal computer for under £100.

Then, the ZX81. With up to 16K RAM available, and the ZX Printer. Giving more power and more flexibility. Together, they've sold over 500,000 so far, to make Sinclair world leaders in personal computing. And the ZX81 remains the ideal low-cost introduction to computing.

Now there's the ZX Spectrum! With up to 48K of RAM. A full-size moving-key keyboard. Vivid colour and sound. High-resolution graphics. And a low price that's unrivalled.

Professional power– personal computer price!

The ZX Spectrum incorporates all the proven features of the ZX81. But its new 16K BASIC ROM dramatically increases your computing power.

You have access to a range of 8 colours for foreground, background and border, together with a sound generator and high-resolution graphics.

You have the facility to support separate data files.

You have a choice of storage capacities (governed by the amount of RAM). 16K of RAM (which you can uprate later to 48K of RAM) or a massive 48K of RAM.

Yet the price of the Spectrum 16K is an amazing £125! Even the popular 48K version costs only £175!

You may decide to begin with the 16K version. If so, you can still return it later for an upgrade. The cost? Around £60.

Ready to use today, easy to expand tomorrow

Your ZX Spectrum comes with a mains adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black and white).

Employing Sinclair BASIC (now used in over 500,000 computers worldwide) the ZX Spectrum comes complete with two manuals which together represent a detailed course in BASIC programming. Whether you're a beginner or a competent programmer, you'll find them both of immense help. Depending on your computer experience, you'll quickly be moving into the colourful world of ZX Spectrum professional-level computing.

There's no need to stop there. The ZX Printer – available now – is fully compatible with the ZX Spectrum. And later this year there will be Microdrives for massive amounts of extra on-line storage, plus an RS232 / network interface board.

Key features of the Sinclair ZX Spectrum

- Full colour – 8 colours each for foreground, background and border, plus flashing and brightness-intensity control.
- Sound – BEEP command with variable pitch and duration.
- Massive RAM – 16K or 48K.
- Full-size moving-key keyboard – all keys at normal typewriter pitch, with repeat facility on each key.
- High-resolution – 256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.
- ASCII character set – with upper- and lower-case characters.
- Teletext-compatible – user software can generate 40 characters per line or other settings.
- High speed LOAD & SAVE – 16K in 100 seconds via cassette, with VERIFY & MERGE for programs and separate data files.
- Sinclair 16K extended BASIC – incorporating unique 'one-touch' keyword entry, syntax check, and report codes.

rum

ZX Spectrum software on cassettes – available now

The Spectrum software library is growing every day. Subjects include games, education, and business/household management. Flight Simulation...Chess...Planetoids...History...Inventions...VU-CALC...VU-3D ...Club Record Controller...there is something for everyone. And they all make full use of the Spectrum's colour, sound, and graphics capabilities. You'll receive a detailed catalogue with your Spectrum.

ZX Expansion Module

This module incorporates the three functions of Microdrive controller, local area network, and RS232 interface. Connect it to your Spectrum and you can control up to eight Microdrives, communicate with other computers, and drive a wide range of printers.

The potential is enormous, and the module will be available in the early part of 1983 for around £30.

sinclair

Sinclair Research Ltd, Stanhope Road, Camberley, Surrey GU15 3PS.
Tel: Camberley (0276) 685311.

The ZX Printer – available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers ZX Spectrum owners the full ASCII character set – including lower-case characters and high-resolution graphics.

A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your ZX Spectrum. A roll of paper (65ft long and 4in wide) is supplied, along with full instructions. Further supplies of paper are available in packs of five rolls.

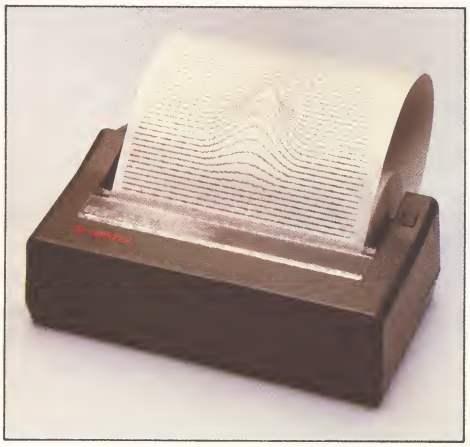
The ZX Microdrive – coming soon

The new Microdrives, designed especially for the ZX Spectrum, are set to change the face of personal computing by providing mass on-line storage.

Each Microdrive can hold up to 100K bytes using a single interchangeable storage medium.

The transfer rate is 16K bytes per second, with an average access time of 3.5 seconds. And you'll be able to connect up to 8 Microdrives to your Spectrum via the ZX Expansion Module.

A remarkable breakthrough at a remarkable price. The Microdrives will be available in the early part of 1983 for around £50.



How to order your ZX Spectrum

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day. BY FREEPOST – use the no-stamp needed coupon below. You can pay by cheque, postal order, Barclaycard, Access or Trustcard.

EITHER WAY – please allow up to 28 days for delivery. And there's a 14-day money-back option, of course. We want you to be satisfied beyond doubt – and we have no doubt that you will be.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR. **Order**

Qty	Item	Code	Item Price £	Total £
	Sinclair ZX Spectrum – 16K RAM version	100	125.00	
	Sinclair ZX Spectrum – 48K RAM version	101	175.00	
	Sinclair ZX Printer	27	59.95	
	Printer paper (pack of 5 rolls)	16	11.95	
	Postage and packing: orders under £100	28	2.95	
	orders over £100	29	4.95	
			Total £	

Please tick if you require a VAT receipt ☐

*I enclose a cheque/postal order payable to Sinclair Research Ltd for £ _____

*Please charge to my Access/Barclaycard/Trustcard account no.

*Please delete/complete as applicable

Signature

PLEASE PRINT

Name: Mr/Mrs/Miss

Address

SUS 905

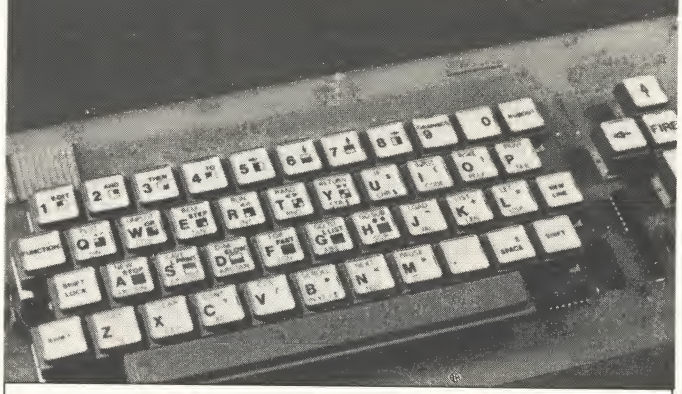
FREEPOST – no stamp needed. **Prices apply to UK only.** **Export prices on application.**

ZX 81 User

YOU deserve a High Quality Keyboard for only £39.95

Ten Good Reasons why the MUKBUS keyboard represents a quality product for the amateur/professional user.

★ Full Size Space Bar
MUKBUS Mother Board Compatible ★
★ Colour Coded Keycap Legends
Shift Lock with L.E.D. ★
★ Cursor Pad
No Separate Power Supply Required ★
★ Fire Button
Future User Function Key Capacity ★
★ Automatic Delete Key
Positive Tactile Key Response ★



Cheques/P.O. please to:
MICROTEXT (UK) Ltd,
22–24 John Street,
Luton
Beds LU1 2JE

Price £39.95
inc VAT
+ £2 P&P

Please Print Clearly
Name.....
Address.....
.....Tel: No .....

University Software

LIBRARY OF ADVANCED MATH/STAT/ECON

TAPE 1: MATRIX OPERATIONS — **SPECTRUM £6.95, ZX82 £5.95**

Side A: Inversion, multiplication, addition, subtraction and scalar multiplication of matrices and vectors within one single program. Any output can in turn be used as the input of the next operation without re-typing. Capacity: 16K ZX81: 25×25, 16K Spectrum: 17×17, 48K Spectrum: 48×48.
Side B: Determinants of square matrices.

TAPE 2: POLYNOMIALS — **SPECTRUM £6.95, ZX81 £5.95**

Side A: Includes quadratic equations (as degree 2 polynomials) and Newton-Raphson and half-interval search methods for higher degree polynomials. Computes the roots with 8 digits of precision.
Side B: You can plot polynomials in any interval and examine their roots, extremum points.

TAPE 3: INTEGRATION — **SPECTRUM £6.95, ZX81 £5.95**

Side A: Integration of functions by Simpson's and trapezoidal rules. Also computes the area enclosed by two functions.
Side B: Plot of integrals. Integration can be visualised on the screen.

TAPE 4: REGRESSION — **SPECTRUM £7.95, ZX81 £6.95**

Side A: A highly developed multivariate regression program featuring Log/Ln option on each variable (thus allowing exponential and geometric regressions), R^2, corrected R^2, standard errors, t-statistics, F-statistics, degrees of freedom, Durbin-Watson statistic, interpolation. Capacity (no of variables × no of observations); 16K ZX81: 1×500, 5×250, 10×140, 16K Spectrum: 1×220, 5×100, 10×50, 48K Spectrum: 1×1800, 5×900, 10×500.
Side B: Plot of bivariate regressions. You can see how your computer draws a best-fitting line on a set of numbered data points.

TAPE 5: LINEAR PROGRAMMING — **SPECTRUM £7.95, ZX81 £6.95**

Side A: A user friendly optimisation program capable of handling all sorts of linear programming problems (any combination of $<,=,>$, constraints and $x_i>$, $x_i<0$, $-\alpha<x_i<\alpha$ sign constraints). Features the cannonical equivalent of the primal, values of slack variables and the dual. Capacity (no of variables × no of constraints); 16K ZX81: 10×23, 15×20, 20×15, 16K Spectrum: 10×10, 48K Spectrum: 10×50, 25×40, 50×30.
Side B: Solutions of simultaneous equations.

PROFESSIONAL LINEAR PROGRAMMING — **£14.95**

Available for 16K ZX81 and 48K Spectrum with above features, plus 'save-data' and 'change-data' (incl. obj, coeff. of obj, coeff. of constraints, constants, signs of constraints, sign constraints) facilities.

- Cheques payable to:
  UNIVERSITY SOFTWARE
  45/c Sloane Street
  London SW1X 9LU
- All incl. prices for first class P&P
- Delivery within a week of receipt
- Tapes 1 – 5 Spectrum £35
  ZX81 £30

* 16K or 48K Spectrum, 16K ZX81

TASWORD THE WORD PROCESSOR

48K SPECTRUM

"Very good value and great fun to use."
"Unreservedly recommended."
Popular Computing Weekly 19/8/82 – ZX81 Tasword

Now your Spectrum becomes a word processor with TASWORD. All the features of the ZX81 Tasword plus many extras. Designed to fully utilise the capacity and capabilities of your 48K Spectrum. More than 6K of machine code, a Basic program, and a manual, to give you a usable and powerful package.

Use TASWORD to produce your letters, essays, papers, records, lists, and for almost any task that requires the written word.

Whether you have serious applications or simply want to learn about word processing, TASWORD makes it easy and enjoyable.

TASWORD TUTOR
"an eloquent demonstration of Tasword's uses"
We send you a manual and a cassette. The cassette contains TASWORD and TASWORD TUTOR. This teaches you word processing using TASWORD.

£7.95 fully inclusive mail order price.

£1 DEMONSTRATION CASSETTE

See for yourself what TASWORD can do. Send just £1 for a demonstration cassette. This cassette contains the TASWORD program (with some facilities inhibited) and a text file which describes and demonstrates the performance and features of TASWORD. A voucher is included which gives you 50p off the price of Tasword.

TASMAN SOFTWARE

17 HARTLEY CRESCENT LEEDS LS6 2LL

ZX81 TASWORD

Tasword for the ZX81 (16K) is still available at £6·50. No demonstration cassette available but send 50p (refundable against your subsequent purchase of ZX81 Tasword) for a copy of the manual.

A NEW SERIES FOR FIRST TIME USERS

"Learning to Use" is a new series of books which introduces newcomers to the most widely used micros in the marketplace.

The books assume absolutely no knowledge about computers and the reader is shown even the most fundamental operations such as "switching on" and "loading a program". The books lead the reader through simple programming and then on to graphics, with several programs which show how to achieve pictures and even animation!

The user-friendly approach is consistent throughout the text – not only are program listings clearly shown, but in many cases, a photograph is included to show what the program looks like when actually loaded and run!

All books in the series are £5.95 (incl. postage).

Gower

"Robin Bradbeer's book is well illustrated with photographs, drawings and diagrams which make the text easy to read and understand . . . after reading it, it shouldn't be long before the reader feels capable of tackling the machine in a masterful way."

Personal Computer News

Order Form to: READ-OUT BOOKS AND SOFTWARE

8 CAMP ROAD, FARNBOROUGH, HANTS, GU24 6EW.
24 Hour Answering Service. Telephone 0252 510331/2

Name _____

Address _____

_____

Please send me .....copy/ies of ☐ Learning to Use the ZX Spectrum
☐ Learning to Use the ZX81 Computer

@ £5.95 including postage and packing. (Allow 14 days for delivery.)

Make cheques payable to Read-Out Publishing Company Ltd.

I enclose my cheque for £.....

Please debit my Access ☐ Number ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Signed _____ Date _____

SU5

Spectrum games to match your mood from

DYMOND SOFTWARE

Gambling Tape (Spectrum 16K). Caters for the addictive gambler, enabling him to indulge in his obsession in a harmless way. Comprises Fruit Machine; Four realistic fast-spinning reels, holds nudges, gambling feature, sound effects, plus Poker Dice (up to 8 players) and Slippery Sam (up to 6 players) £4.95

Roulette (Spectrum 48K). For the more sophisticated gambler. Near-facsimili Monte Carlo table, 4 named players can place their chips in most betting combinations. Good linear simulation of wheel and ball, random movement. The Arabs buy this one to try out their systems! £4.95

Feeling aggressive? try our brand new **Dymonoids (Spectrum 16K)** and annihilate them before they get you! £3.95

Tired and fancy something mindless? try the Ludo or Snakes and Ladders of the **Childrens Compendium (Spectrum 16K).** Also contains Beetle and Noughts and Crosses or Fox and Geese where you can pit your wits against the computer or a friend. The Compendium has the advantage over the traditional versions of no dice or counters to loose and no cheating, the computer sees to that! £4.95

Dymond Software
Dept SU
Hospital Road,
Annan, DG12 5HP
Dumfriesshire.

Cash Discounts
2 tapes: deduct £2
3 tapes: deduct £4
4 tapes: deduct £6

All prices include p&p. Money back guarantee.
Trade inquiries invited

IMPORTANT NOTICE ZX SPECTRUM 48K

CYCLE PLANNER is not a game.

MEDIDATA announces a unique software package which establishes a genuine and lasting use for the home computer.

Program 1: **CYCLE PLANNER** — Intelligent and friendly program designed to be run monthly. Analyses the female monthly cycle and computes:
1. Shortest, longest and average cycle lengths.
2. Starting date of next period.
3. Date of maximum fertility (ovulation).
4. "Unsafe" (and "safe") dates.
5. Birth date if conception occurs.

Option for recording dates on Sinclair printer.

Program 2: **GROWTH TRACKER** — Menu-driven, highly interactive guide to:
1. 40 weeks of growth before birth.
2. 24 months of development after birth.
3. The common childhood illnesses.

The MEDIDATA package, which has been designed by a London Teaching Hospital doctor, exposes the potential of the home computer to women, men and families.

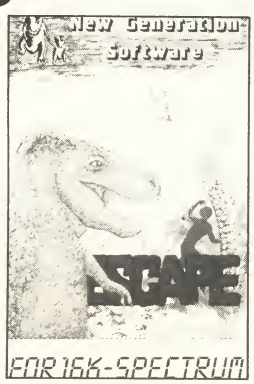
Both programs available on a single cassette (48K Spectrum).

Send orders to **MEDIDATA, PO Box 26, London NW9 9BW.**

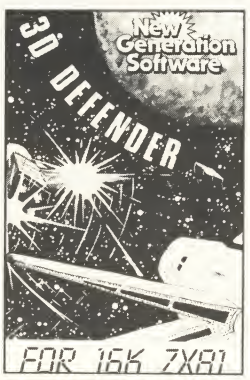
Enclose a cheque/P.O. for £7.25 *(includes P&P).*

Brace yourself for a new generation of software

3D TUNNEL – 16K/48K Spectrum
A full action adventure game to test your skill and nerve. What lies in the depths of the tunnel? Flying bats, leaping toads, scurrying rats, crawling spiders all appear in the depths of the moving tunnel. The 48K version also holds a surprise in store! **ONLY £5.95** Compatible with Kempton and AGF Joysticks. "3D Tunnel contains some of the most impressive graphics you're likely to see on the Spectrum" Computer and Video Games.

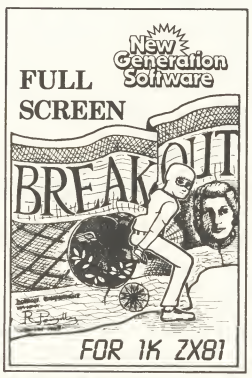


ESCAPE – 16K Spectrum
You'll need plenty of stamina to escape the dinosaur infested maze. You'll have to find the axe and break out of the maze, but the Triceratops will be looking for you and the Pteranodon could swoop down on you at any time! **ONLY £4.95** "One of the best and most original games we have seen for the Spectrum so far" Sinclair User.



3D DEFENDER* – 16K ZX81
Fancy yourself as a spacefighter? Here's your chance to find out how good you would be in defending your home planet. A fast moving machine code game in 3D with meteors, stars, explosions, plasma blasts, photon beams and of course alien space craft to look out for! Your cockpit display will show shield strength, altitude, proximity, forward radar and your score. **ONLY £4.95** "Another 3D winner" Sinclair User.

3D MONSTER MAZE* – 16K ZX81
The ultimate 3D maze game for your ZX81, not only do you have to find your way out of the maze but you'll have to watch out for the T.Rex – it will actually run towards you when it sees you! Fast moving machine code graphics. **ONLY £4.95** "If I had to choose just one program to impress an audience with the capabilities of the ZX81, the 3D Monster Maze would be the one without doubt" ZX Computing.



FULL SCREEN BREAKOUT* – 1K ZX81
You've probably played breakout before but never with the incentive of this one! See how much money you can win and watch the pounds convert to dollars. 3 speeds, 2 bat sizes and 3 angles of rebound all in machine code. **ONLY £1.95** "Best of its kind" Which Micro and Software Review.

*These games have previously been available from J K Greye Software Ltd.

Please rush me:
☐ 3D Tunnel 16K/48K @ £5.95 inc.
☐ Escape @ £4.95 inc.
☐ 3D Defender @ £4.95 inc.
☐ 3D Monster Maze @ £4.95 inc.
☐ Full Screen Breakout @ £1.95 inc.
Please tick box Total inc.

Price _____

Cheques/PO payable to New Generation Software

Name _____

Address _____

Dept No. SU5

New Generation Software Freepost BS3433 Oldland Common Bristol BS15 6BR

All games written by Malcolm Evans-The 3D expert. For instant despatch phone 01-930 9232 and quote your credit card number.

New Generation Software

Freepost BS3433 Oldland Common
Bristol BS15 6BR

Talking in languages the computer understands

John Gilbert reviews the latest books on machine code

MANY SINCLAIR owners are turning their attention to machine code and trying to program either in direct Z-80 low-level code or in assembly language. Publishers have also entered that area of the market and several good books have been produced.

Melbourne House has two new books which cover machine code and related subjects more than adequately. The first is by Dr Ian Logan, author of several books and pamphlets on the ZX-81 ROM. *Understanding Your Spectrum* covers both Basic and machine code programming. Its aims are to show how the Spectrum works, to teach Z-80 machine code, and to give the reader an understanding of the ROM operating system in the machine. Logan does all those things in a very expert manner which even the beginner should understand.

The other book from Melbourne House is *Spectrum Machine Language For The Absolute Beginner*. It is even easier to understand than Logan's. It starts from a very simple base and takes the reader through most of the Z-80 instruction set as implemented on the Spectrum.

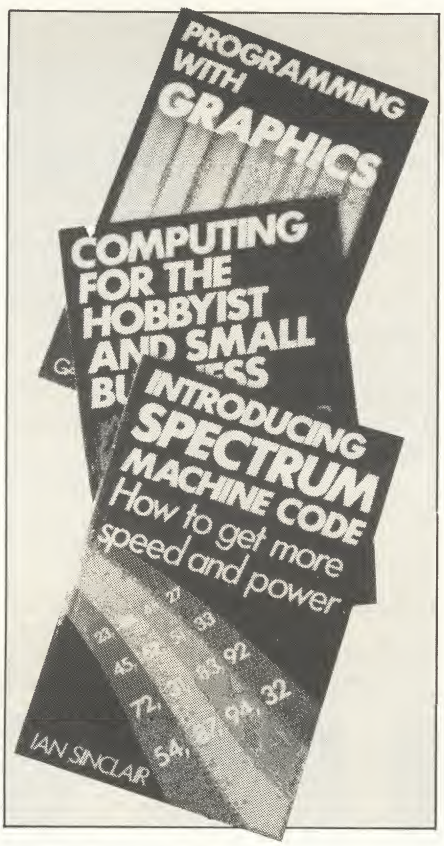
The theory is supported by practical examples which can be entered and run by anyone. The book is completed by taking the reader from conception to the completion of an arcade game, Frogger, written all in machine code.

Both books are excellent in content but a little over-priced. *Understanding Your Spectrum* costs £7.95 and *Spectrum Machine Language For The Absolute Beginner* £6.95. If you are thinking of programming in machine code, the books will teach you almost everything you want to know.

A good alternative is *Introducing Spectrum Machine Code* by Ian Sinclair. It provides an easy introduction to machine code but does not offer so much in terms of content as the Melbourne House issues.

Sinclair begins by introducing the reader to ROM and RAM. He shows how both those systems are used to give the user an easy way of programming. He then provides a long discussion of Z-80 programming. The book is sprinkled adequately with examples and many of the machine code routines explained are put into Basic listings in the form of DATA, to allow the user to enter them quickly. *Introducing Spectrum Machine Code*, from Granada Publishing, costs £7.95.

The range of books not aimed at a particular computer is growing. Several will prove useful to Sinclair owners.



Some Useful Basic Subroutines again is written by Ian Sinclair. He uses Micro-Soft-type Basic and some of the routines will need re-writing to work on Sinclair machines. The book would be of great value to ZX-81 users, as it includes Basic routines for flashing, scrolling and centring titles, underlining titles and sorting data. From Newnes Microcomputer Books, it is good value at £4.95.

Get More From Your Personal Computer is another title from Newnes. The author is Ian Hickman. It deals with the development of the computer, explains Basic programming and then the principles behind number systems, logic diagrams and, finally, machine code.

It works well as a general guide to the principles of computing and the way in which humans and computers interact. It costs £5.95.

Another general book of interest to Sinclair users is *Programming With Graphics* by Garry Marshall. It takes the reader through the various types of graphics on computer systems — block, pixel and high resolution. There are also chapters dealing with the production of graphic displays, three-dimensional representation and animation.

For those wishing to produce arcade games or who want to demonstrate physics experiments on the screen, the book is ideal. If you want to know how those images on TRON were created, but at a much simpler level, you will get some idea from the book. It is available from Granada and costs £5.95.

The Youngs Computer Register for the ZX-80 and ZX-81 has just been republished. It now contains an extra supplement with invaluable information on the Sinclair market.

The guide lists the names and addresses of most software and hardware companies and also provides information on products. As with the previous issue, the register is split into sections for easy reference.

Together with the supplement, it can be obtained from Youngs Computer Publications for £3.95. The supplement is also available separately for £2.

The quality of books both in content and packaging is improving as the market expands. Computer books are now finding their way from the technical to the general sections of bookshops. That is a good move, as it will make more people aware of the computer market.

Melbourne House (Publishers) Ltd, Glebe Cottage, Glebe House, Station Road, Cheddington, Leighton Buzzard, Bedfordshire LU7 7NA.
Granada Publishing, PO Box 9, Frogmore, St Albans, Hertfordshire AL2 2NF.
Newnes Microcomputer Books, The Butterworth Group, Borough Green, Sevenoaks, Kent TN15 8PH.
Youngs Computer Register, 2 Woodland Way, Gosfield, Halstead, Essex CO9 1TH.

ORWIN SOFTWARE: ZX81 CASSETTES

THE BEST SOFTWARE (BY VARIOUS AUTHORS) AT LOW PRICES

"Michael Orwin's £5 Cassette Two is very good value. It contains 10 stolid well designed games which work, offer plenty of variety and choice, and are fun."

Your Computer, May '82

"Michael Orwin has built a reputation for value-for-money software and his Cassette 4 offers quantity as well as quality."

Sinclair User, October '82

"If each game was on a separate tape and selling for £5 each I would still recommend them. But all on one for £5 . . . ! This sort of value for money just has not been seen before on any personal computer."

"Without sounding pushy I would like to conclude this review by saying — if you have a ZX81 and like games, then you should buy Michael Orwin's cassette 4."

2 extracts from *ZX Computing*, Oct/Nov '82

"Eight games, including an excellent version of the Scramble arcade game, three-dimensional noughts and crosses, dropping bombs on sprouting plants and a western style shoot-out. Easy to operate, graphically impressive and good value for money."

The Times, Saturday 11th December 1982
(*about Cassette 4*)

CASSETTE 1
(eleven 1k programs)
Machine code:
React, Invaders, Phantom aliens, Maze of death, Planet lander, Bouncing letters, Bug splat.
Basic:
I Ching, Mastermind, Robots, Basic Hangman. PLUS Large screen versions of Invaders and Maze of Death, ready for when you get 16k.
Cassette One costs £3.80

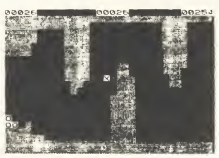
CASSETTE 2
Ten games in Basic for 16k ZX81
Cassette Two contains Reversi, Awari, Laser Bases, Word Mastermind, Rectangles, Crash, Roulette, Pontoon, Penny Shoot and Gun Command.
Cassette Two costs £5.

CASSETTE 3
8 progams for 16k ZX81
STARSHIP TROJAN

Repair your Starship before disaster strikes. Hazards include asphyxiation, radiation, escaped biological specimens and plunging into a Supernova.
STARTREK This version of the well known space adventure game features variable Klingon mobility, and graphic photon torpedo tracking.
PRINCESS OF KRAAL An adventure game.
BATTLE Strategy game for 1 to 4 players.
KALABRIASZ World's silliest card game, full of pointless complicated rules.
CUBE Rubik Cube simulator, with lots of functions including 'Backstep'.
SECRET MESSAGES This message coding program is very txlp qexi jf.
MARTIAN CRICKET A simple but addictive game (totally unlike Earth cricket) in machine code. The speed is variable, and its top speed is very fast.
Cassette Three costs £5.

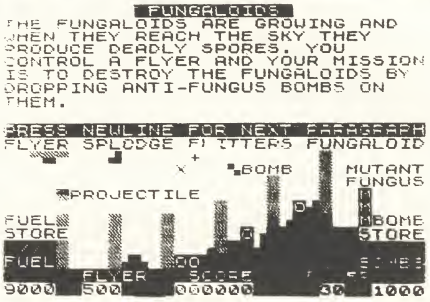
CASSETTE 4 **8 games for 16k ZX81**

ZX-SCRAMBLE (machine code) with 3 stages.
Bomb and shoot your way through the fortified caves.



GUNFIGHT
(machine code)

INVADERS
(machine code)



GALAXY INVADERS (machine code)
Fleets of swooping and diving alien craft to fight off.
SNAKEBITE (machine code)
Eat the snake before it eats you. Variable speed. (very fast at top speed).
LIFE (machine code)
A ZX81 version of the well known game.

3D TIC-TAC-TOE (Basic)
Played on a 4 × 4 × 4 board, this is a game for the brain. it is very hard to beat the computer at it.

7 of the 8 games are in machine code, because this is much faster than Basic. (Some of these games were previously available from J. Steadman). Cassette 4 costs £5.

Please make cheques payable to ORWIN SOFTWARE. Recorded on high quality cassettes, sent by first class post from:
ORWIN SOFTWARE, Dept. OSU, 26 Brownlow Road, Willesden, London NW10 9QL.
ZX81 & SPECTRUM SOFTWARE WANTED

At last . . .
Exciting AND Challenging Computer Games for Two Players.

CONFLICT A total war for two players involving both the machinery (armies, missiles, warships) and finance (stock market, oil, piracy) of conflict. *"I enjoyed this strategy game" (Computer and Video Games).*

GALAXY CONFLICT Raise a fleet of Battle Eoncruisers then move from bridge to bridge taking full control and responsibility in this battle for the heavens. Born galactic rulers will do well. *"Galaxy battle sets new trend" (Sinclair User).*

Games Include — ZX81 (16K) and Spectrum (48K) programs on ONE cassette. Full size professionally printed board. Counters and markers. Two pads disposable maps (Conflict only). Comprehensive instructions/rules.

✸Professionally packaged in high quality attractive box.

✸Each game only £11.95 inc. Postage or £22 for both games.

✸Available from W. H. Smith, Buffer, Games Centres and many other retail outlets or mail order from:

martech games

9 Dillingburgh Road, Eastbourne
East Sussex BN20 8LY

EDUCATIONAL COMPUTING on the ZX81

Suit children ages 5-11

strongly recommended by educational authorities

No comparable collection offers so much for so little

Fifty high-quality programs to turn your ZX81 or Spectrum into a powerful educational tool.

And you don't even need to know programming. There are clear instructions and plenty of tips & advice. Designed to go beyond drill & practice the promote learning through interaction & discovery.

Almost all programs work on the **SPECTRUM**

All programs fit 1K

Creative use of graphics

Many innovative ideas

Fully documented

Includes many games

Educare's **50** 1K PROGRAMS for PRIMARY EDUCATION

Includes:-

TORTOISE
A simplified version of the famous Turtle programme

CODED MISSILE
Combines the fun of arcade games with learning

£5·95 only
paperback 110 pages
plus Spectrum supplement

Graph-plotter ● Histogram ● Simon-spell ● Sketchboard ● Times-table ● Sets
Series-quiz ● XY-coordinates ● Count ● Equations ● Areas ● Guess-a-Volume
Angles ● Upstairs-Downstairs ● Music-notes ● See-saw ● Wipe-out ● Spell
Temperature ● Clock ● Money ● Snake
Mastermind ● Number-shoot ● +26 more **EDUCARE**

To: EDUCARE, 139a Sloane St., London SWIX 9AY

Please send me.....copies Educare's 50.
I enclose cheque/postal order for £.....
Name.....
Address.....
.....

Let your child benefit early - Send now

SINCLAIR OWNERS READ THIS FROM

You've probably heard about MACHINE CODED PROGRAMS and thought "so what! How can they help me?"

Well now you can find out and taste the very real difference by purchasing our latest MACHINE CODED programs. These emulate features of the most modern professional computers (12 years writing machine coded programs for IBM, ICL, UNIVAC and Sinclair means we know what we're talking about).

Just read the specification and you'll see what we mean.

MACHINE CODE TEST TOOL

The ultimate professional tutor and de-bug program, we wrote this to help us write our own programs.

- **TEST** and display machine code instructions as they're written.
- **IDEAL** for both the novice and the expert.
- **FULLY** documented with a 32 page tutorial
- **HEX:DECIMAL** conversion as standard.
- **CHARACTER GENERATOR —** of unbelievable quality!!! supplied free with the Spectrum version.

Available for the 16K ZX81 and 16/48K Spectrum.

SPECTRUM CHESS

Dare you face The Turk

The original Turk was an eighteenth century automaton, a life- size mechanical figure resplendent in Turkish costume and seated behind a wooden cabinet on which a chess board and pieces were placed.

OCP now offer you the twentieth century equivalent of that Turk — a chess-playing computer program.

The Turk challenges you to a game of chess!

MANY OPTIONS INCLUDE:

- 6 LEVELS OF DIFFICULTY
- DEMONSTRATION MODE
- BOARD EDITOR
- GAMES PRINTOUT FACILITY
- BLITZ CHESS AGAINST THE CLOCK
- TWO PLAYER MODE
- UNFINISHED GAMES CAN BE STORED
- RECOMMENDED MOVE

FULL INSTRUCTIONS PROVIDED

ADDRESS MANAGER.....

Works on the 16K and 48K Spectrum, in 48K it will store, file, select and retrieve over 400 full addresses (over 1500 individual names); Dynamic Memory Management and compression techniques makes all this possible and there's a lot more:

- **FULL SCREEN INPUT and EDITING —** see it as a page as it happens with insert, delete and TAB Commands.
- **MULTIPLE INDEXING —** 3 way user-defined index enables you to define, catalogue, select and print entries as needed, (essential for the more sophisticated applications.)
- **INSTANT RESPONSE —** yes, this program is very very fast.
- **SUPER FRIENDLY —** crash-proof, extremely easy to use and efficient in a way that BASIC can never be.

MANY USES

- **AT HOME —** (storing addresses, printing out Xmas Card lists etc.)
- **AT WORK —** for mail-order work, internal telephone directory, sorting customers into types, areas, size . . . you choose.
- **CLUBS —** print-out members list, sort different categories etc.

MACHINE CODE..IT MAKES ALL THE DIFFERENCE.....

Post order to: Oxford Computer Publishing Ltd., P.O. Box 99, Oxford.

Please rush me: ADDRESS MANAGER at £8.95 each. ☐ Spectrum only.
CHESS THE TURK at £8.95 each. ☐ Spectrum only.
MACHINE CODE TEST TOOL at £9.95 each.

Tick box for edition required: ☐ ZX81 ☐ Spectrum

Send cheque, postal order or ACCESS No. to above address. Or telephone order with ACCESS No. to (0753) 888866

NAME:.....

ADDRESS:.....

..... POSTCODE:.....

Available from most branches of **W H SMITH** and other retailers

DOCIMODUS

Games and serious software for 48K ZX Spectrum

CITY. A property development game played on a street map. Full colour graphics, sound, mid game saves and multi-levels. Can take from a couple of hours to months. You can race against an accelerated calendar, play a long game against the computer or against other players or combinations of these factors. Can your arrange your factories, houses, shops etc in such a way that people will move in? Can you earn a million pounds before any of the other four ''development companies''? *City* **£7.95**

MULTIPLE ACCOUNT BUDGET SYSTEM. This accounting and budgeting system handles a large variable number of individual item accounts and up to 1000 transactions per file with no limit on the number of files. Comments can be added to the transactions and each item can have up to 6 lines of comments. Each item description has a budget profile which allows complex analysis and forward projection of cash flow trends. Periodic totals for items, item groups, income, expenditure or combinations of these factors can be produced. A ZX Printer, while useful, is not essential. *MABS* **£9.95**

ASSOCIATIVE DATABASE SYSTEM. After looking very closely at conventional information storage we realised that data in an unstructured form can only be held in a database system when that database is totally flexible and capable of adapting to the requirements of the user as it is used. ADBS provides such a system of data storage, and a retrieval system which works by association rather than search. (Though a search system is also provided). External file linkage extends the capacity of ADBS to infinity and linkage to other database programs is possible. *ADBS* **£13.95**

DOCIMODUS

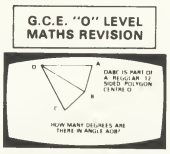
161 Walmersley Road, Bury, Lancashire BL9 5DE

EDUCATIONAL SOFTWARE

ZX 81 (16K) AND SPECTRUM

INTERMEDIATE MATHS 1 (ZX 81 and 48K Spectrum):—
Long Multiplication, Long Division, Highest Common Factor, Lowest Common Multiple, Fractions 1 (+ & −), Fractions 2 (× & ÷).

INTERMEDIATE MATHS 2 (ZX 81 and 48K Spectrum):—
Areas, Perimeters, Simple Equations, Percentages, Sets, Venn Diagrams.

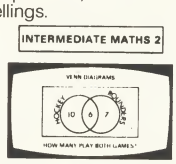


PRIMARY ARITHMETIC (ZX 81 and 16K or 48K Spectrum):—
Add, Subtract, Multiply and Divide. Numbers are in large size type. Entry of answer with units first.

EDUCATIONAL QUIZ (ZX 81):—
4 programs for the family. Questions on General Knowledge, Reasoning, English and Maths. All questions use RND function.

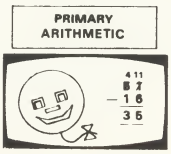
INTERMEDIATE ENGLISH 1 (ZX 81 and 16K or 48K Spectrum):—
Meanings 1, Meanings 2, Parts of Speech, Proverbs, Similes, Anagrams.

INTERMEDIATE ENGLISH 2 (ZX 81 and 16K or 48K Spectrum):—
Idioms, Opposities 1, Opposites 2, Group Terms, Odd Word Out, Spellings.



"O" LEVEL MATHS REVISION (ZX 81):—
1 teach and test program plus two programs using generated questions from the "O" level syllabus.

"O" LEVEL FRENCH REVISION (ZX 81):—
3 teach and test Grammar program, plus 3 comprehensive Vocabulary programs



£4.95 per cassette, or send sae for catalogue to:—

ROSE CASSETTES,

148 Widney Lane, Solihull, West Midlands B91 3LH.

Programmers: We are looking for *Spectrum* educational software.

DRAFT

Data Review, Analysis & Formulation Technique

Makes the 16K-ZX81 a serious data processing tool

"... probably the best spreadsheet program available for the ZX81."

"... turns the ZX81 into a serious tool for recording and analysing data at home."

"Thoughtfully written and very easy to use — yet more comprehensive than many programs written for larger computers and which take days to master."

- Spreadsheet flexible from 5 to 80 columns wide with up to 450 "grid positions"
- Comprehensive report generator and full text/data listing facilities are usable at any stage — all with instant machine code speed
- Columns are displayed 3 at a time in any order you wish — vastly superior to the clumsy "window" system
- Range of 21 calculating functions: Arithmetic, Average, Percentage, Group Total, £0.00 justification and all the keyboard scientific and trigonometric functions
- All reports and listings duplicated on the ZX printer as continuous copy
- Named DRAFT files can be 'saved' either full or empty but structured for repetitive later use
- Detailed instruction manual covers all facets of the program

£7·50 including despatch.

Send now to Myrmidon Software, PO Box 2, Tadworth Surrey KT20 7LU

Please send me ___ DRAFT program(s)

I enclose a cheque/p. order for £ _____

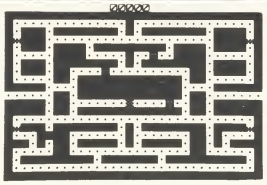
Name _____

Address _____

_____

GOBBLERS

PUCKMAN FOR 16K ZX81



BEAT THAT HIGH SCORE! GOBBLE THOSE DOTS BEFORE THOSE MEANIES GOBBLE YOU! YOUR ONLY AIDES ARE FOUR "POWER PILLS" WHICH MAKE THE MEANIES EDIBLE. BUT NOT FOR LONG!

- MACHINE CODED FOR FAST ACTION
- EXTRA "GOBBLER" FOR 10,000 POINTS
- ON SCREEN SCORING
- HIGH SCORE WITH "ENTER NAME" FACILITY
- UP TO 4 PLAYERS

AN ANNOYINGLY FRUSTRATING GAME FOR ONLY £5.95

ASTEROIDS

FOR 16K ZX81

STAY ALIVE AS LONG AS POSSIBLE IN OPEN SPACE FILLED WITH FLYING ROCKS. SCORE BY SHOOTING THEM — WHICH ALSO CAUSES THEM TO BREAK INTO LOTS OF LITTLE BITS AND MAKES LIFE EVEN WORSE!

- MACHINE CODED FOR FAST ACTION
- ON SCREEN SCORING
- HIGH SCORE WITH 'ENTER NAME' FACILITY
- UP TO 4 PLAYERS
- EXTRA SHIP FOR 1,000 PTS (NOT AS EASY AS IT SOUNDS!)
- SHIP MOVES JUST LIKE ARCADE VERSION
- ROTATE LEFT/ROTATE RIGHT/THRUST
- FIRES IN ALL 8 DIRECTIONS
- INCREASING NUMBER OF ASTEROIDS
- THREE ASTEROID SIZES
- 'NASTY' ALIEN SPACE-SHIP (FIRES BACK!)

THIS GAME IS JUST AS BAD — AND ONLY £5.95

AN OFFER FOR REAL MASOCHISTS - BOTH TAPES FOR £9.95

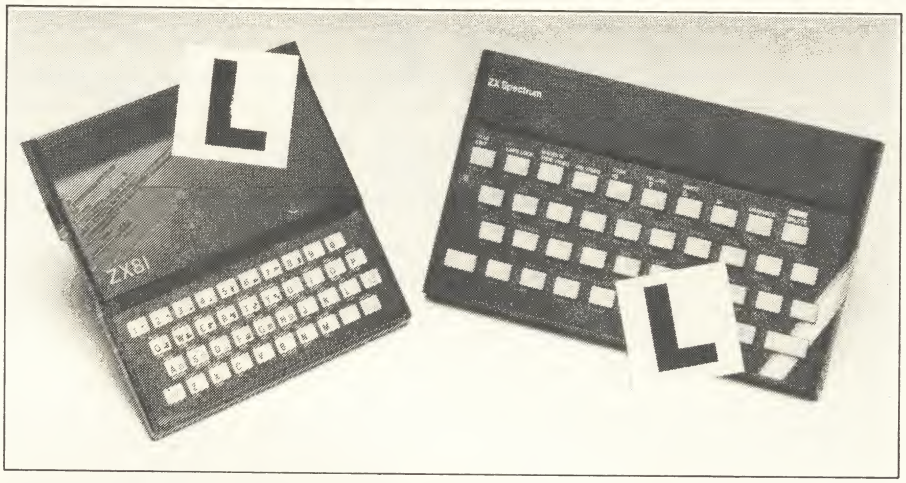
MAIL ORDER ONLY-PLEASE MAKE CHEQUE/PO PAYABLE TO

THE SOFTWARE FARM Dept. SU

CRAIGO FARM, BOTANY BAY, TINTERN, GWENT

GLOSSARY

Basic — Beginners' All-purpose Symbolic Instruction Code. A programming language resembling English which is used by beginners because most popular microcomputers have it as standard.
Bug — an error in a program.
EPROM — Erasable Programmable Read-Only Memory. Semi-permanent storage. Information is not erased if the power is turned off in the computer. Programs can be erased by subjecting the memory chips to ultra-violet light. The memory can then be re-programmed using an electrical device called an EPROM blower.
Interface — RS232 and Centronics. A device which enables other computers or add-ons, such as printers, to be connected to the computer. It converts non-standard signals from add-ons to the standard signals of the computer in use.
Kilobyte — (K). A measurement of memory size. Most machines use 16K as a minimum but 48K is generally agreed to be necessary for serious work.
Machine code — an electronic pulse code used by the computer to perform functions and communicate with memory and other devices.
Mnemonics — abbreviated instructions — for example LD for Load — used in machine language programming.
Motherboard — an external printed circuit board which is used like a multi-way plug planner. It enables other printed circuit boards, such as graphics boards and colour boards, to be slotted-in.
Port — a link to the outside world which can be used by programs and the computer.
PCB — printed circuit board. A board which has on it the electronic circuits of the computer.
RAM — Random Access Memory. Information and programs can be stored in this type of memory as electronic pulses which conform to a set of numbers — machine language — in which programs are represented in the computer. When the power is turned off the information will be lost.
ROM — Read Only Memory. Information stored in this type of memory is not lost when the power is switched off.
Software — programs which control the operation of the computer.
Syntax error — a bug caused by incorrect use of a programming language.



Our easy-to-follow guide for new owners

The basic route to a habit-forming hobby

BUYING a Sinclair machine can be the start of a life-time's obsession with home computing. It is easy, however, to become discouraged if everything does not go according to plan from the beginning.

For those with only a little knowledge of computers and their capabilities, the best way to approach the machines is to abandon any ideas for special uses. While the 48K Spectrum is big enough for simple uses in small businesses, the range of Sinclair computers does not contain machines for major uses. It is better to become accustomed to the many facilities and then decide how you wish to use them.

Begin by unpacking your machine, overcoming your surprise at its size and weight and, following the manual, set up the system. If you cannot get the K on the screen, check that everything is plugged into its correct socket and re-set the machine by pulling-out the power plug for one second and try tuning-in again. If still nothing appears, check the power supply unit by shaking it. If it rattles, return it. If it is satisfactory, check your system with that of a friend.

If you have a Spectrum you will have received an introductory booklet which explains what the computer can do and giving detailed instructions on how to set it up. Also included is a fault-finding guide.

Once the K appears you are ready to begin learning about your machine. It can prevent family arguments if you can afford a separate television set for your system. It also makes life easier if you find somewhere to leave your equipment set up permanently. You will find that a few power sockets are needed and a four-way block connector on a short length of extension cable will help to tidy trailing leads.

When using a Spectrum, a television set has to be more finely-tuned than when using a ZX-81 because of the added dimension of colour. If the set is not tuned properly, the colours will look hazy instead of sharp and clear. If no colour can be seen when it is switched on, the power supply or the television set may be at fault.

Some users have experienced some difficulty with some television sets, which include Hitachi, Grundig and Toshiba. Sets which many people have found compatible include the Sony Trinitron, Fidelity and Ferguson.

The manuals are written in great detail and are reasonably easy to follow. Some of the chapters may not seem immediately relevant but it is worthwhile reading them as you might miss something important.

Patience is needed at that stage to learn the ways in which the computer will accept information. It is tempting to try to enter programs before you are ready but that is likely to lead to errors. For example, words like AND, THEN and AT should not be typed-in letter by letter.

By the time you have reached chapter 11 in the ZX-81 manual and chapter 19 in the Spectrum manual you should have accumulated sufficient knowledge to be

continued on page 94

Starting from Scratch

continued from page 93

able to type-in other people's programs, such as those in *Sinclair User* and *Sinclair Programs*, without too much difficulty.

It is that important when using the ZX-81 that it is not jolted. Some of the connections can easily work loose and everything which has been entered will be lost.

The manuals are not to everyone's liking and if you find them difficult to follow a number of books on the market can help you. Find the one which suits you best.

As a way of relaxing you can buy some of the growing range of commercially-produced software. That can be loaded directly from cassette but make sure that your machine is big enough to take the tapes you buy.

For the ZX-81 there are a few tapes for the unexpanded 1K machine but the majority require the 16K RAM pack. Similarly on the Spectrum most companies are taking advantage of the possibilities provided by the larger 48K machine rather than providing cassettes for the 16K.

The tapes can vary in quality and it is advisable to read the reviews in *Sinclair User* and use your judgment to find the best.

An alternative method to learn about both the ZX-81 and the Spectrum is to plunge in at the deep end and see what the machines will do. Refer to the manuals when you have difficulties. You can ignore the functions and calculations initially and experiment with PRINT statements to obtain the feel of the machines.

You may already have heard about the problem involved in SAVEing and

LOADing your own cassettes. The manual gives detailed instructions but many of the early ZX-81s would not accept tapes from some recorders. That problem is said to have been overcome but there can still be difficulties.

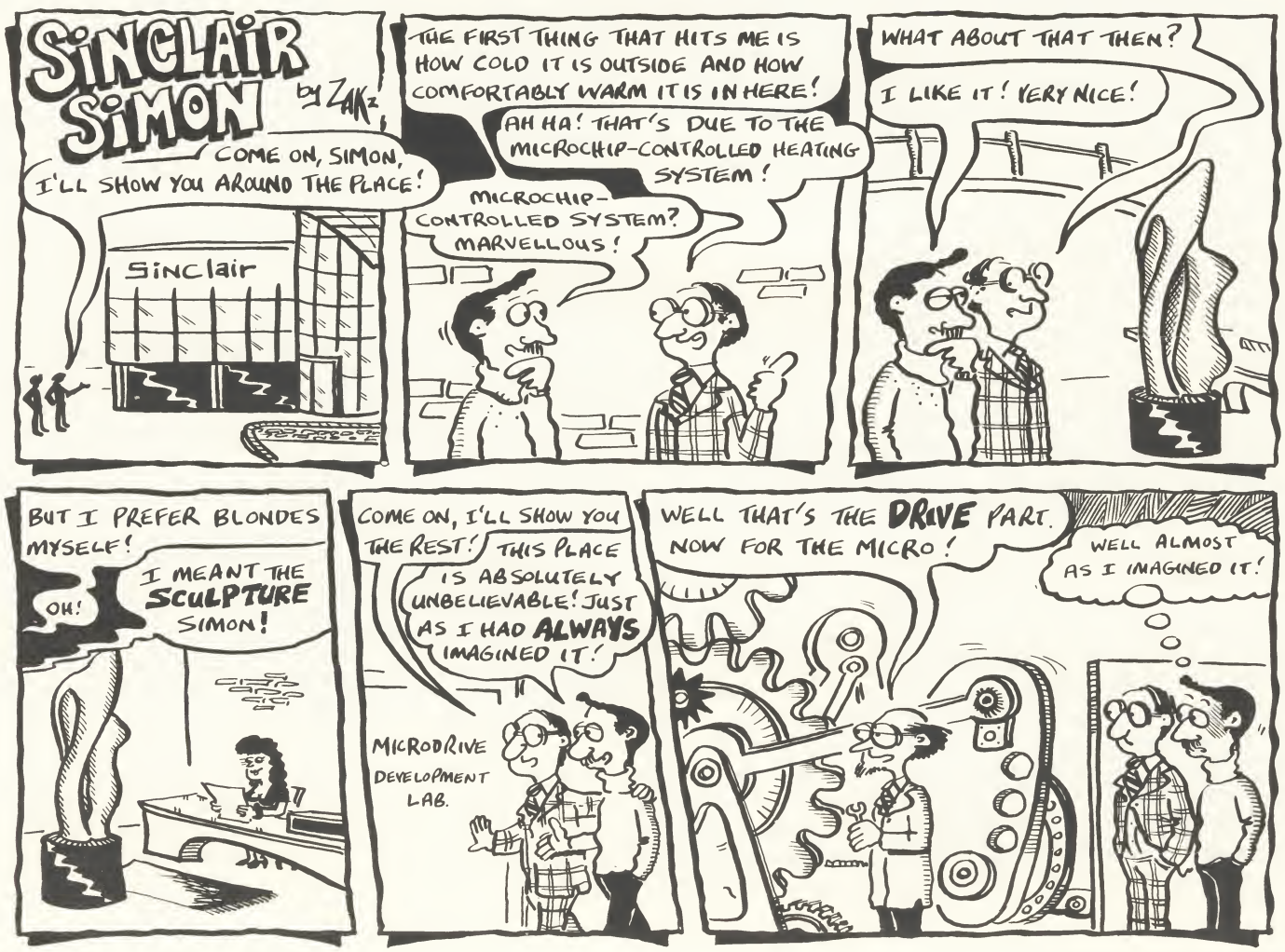
Usually they occur when LOADing tapes recorded by other people. One simple method to overcome this is to wind the tape to the middle of the program and type LOAD "" followed by NEWLINE; then increase the volume of the recorder slowly with the tape running until the television screen shows four or five thick black bands. If you then re-wind the tape, the program should LOAD normally.

LOADing and SAVEing on the Spectrum is much easier and faster than the ZX-81. One difference is that when SAVEing on the Spectrum the LOAD lead must be disconnected either at the recorder or the Spectrum.

Finally, a health warning. Apart from any practical uses, computing with your Sinclair machine can be a very entertaining hobby and is almost certainly habit-forming. You may easily find yourself crouched over your machine, red-eyed, in the early hours of the morning thinking that in another five minutes you will solve the problem. Try to break that habit by getting into the fresh air and meeting other Sinclair users.

By obtaining a Sinclair computer you find that you have joined a not very exclusive club with many thousands of members, many of whom would be only too happy to advise you if you have difficulties.

Make sure of your regular copies of *Sinclair User* and *Sinclair Programs* and you can be guaranteed many happy hours.



ONLY 19-95 +£1·00pp

....Introducing the AGF JOYSTICK INTERFACE II for sinclair ZX Spectrum 81

ABOUT OUR JOYSTICK INTERFACE

Following in the footsteps of our extremely popular original interface, which has sold over 1,000 worldwide since October last year, we have improved its performance.

The Interface Module II has been specially designed to plug on to the rear connector of your ZX Spectrum or ZX81 and allow you to connect any standard Atari type digital Joysticks. All of the computer's connections are duplicated on an extension connector so that you can still use any other devices intended for use with your computer.

The Interface Module II resides in the same memory space as the keyboard, which remains fully functional at all times, therefore it will not interfere with anything else connected.

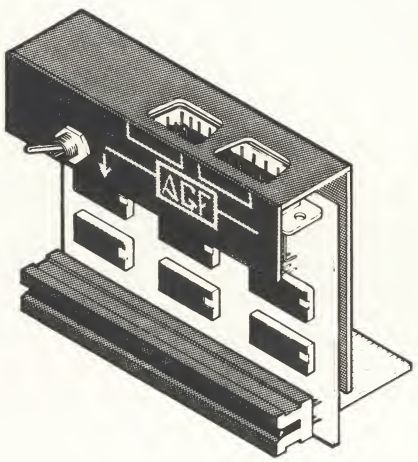
When a suitable joystick is plugged into 'Player 1' socket its action will mimic pressing the cursor keys, up "7", left "5" and so on. The firing button will simulate key ϕ. This unique feature guarantees the best software support.

Take a look at the selection of compatible games we have listed. More are being added all the time as a result of our contact with the various software companies.

A second Joystick may be connected in the 'Player 2' position which simulates in a parallel fashion keys T-Y-U-I-P. This will allow you to play a whole new generation of two player games.

An added advantage of using our Joystick Interface is that you relieve your keyboard of the key-thumping strain of game playing whilst increasing the enjoyment.

Using joystick control in your own programs is as easy as reading keys. Eight directions and Fire are all read by simple BASIC. With every order there comes a free demonstration program called 'Video Graffiti' plus a full set of instructions.



KEY FEATURES

- ★ Proven cursor key simulation for maximum software support
- ★ Accepts Atari, Competition Pro, Wico, Starfighter, Le Stick, etc Joysticks
- ★ Second Joystick facility
- ★ Eight directions programmed in simple BASIC
- ★ Rear extension connector for all other add-ons
- ★ Free demo program, 'Video Graffiti' + full instructions

A SELECTION OF COMPATIBLE SOFTWARE

ZX SPECTRUM

Abersoft	Mazeman	
Axis	Labyrinth	
Campbell Ststems	Gulpman	
DK 'Tronics	☐ 3D Tank	£4.95
	Meteroids	
ICL	Star Trail (Man.Dock)	
New Generation	☐ Escape	£4.95
Software	☐ 3D Tunnel	£5.95
Psion	* Flight Simulation	
	VU–3D	
Silversoft	Ground Attack	
	☐ Cyber Rats	£5.95

ZX81

Artic	Galaxians	
J.K. Greye	3D Monster Maze	
P.S.S.	Krazy Kong	
	Ghost Hunt	
	Maze Drag Race	
Silversoft	Asteroids	

NB ☐ *Available from us, please tick*
* *Not suitable for original interface*

JOYSTICKS

ATARI CONTROLLERS

FOR USE WITH OUR INTERFACE Module II or VIC 20, Commodore 64, Atari VCS, Atari 400, Atari 800

If you require extra Joysticks for our original interface module mark order 'OLD' Joysticks

ONLY £7.54 inc VAT + P&P

FROM: MR/MRS/MISS

ADDRESS

SEND C.W.O. ONLY TO: A.G.F. HARDWARE, DEPT. SU

26 VAN GOGH PLACE, BOGNOR REGIS, WEST SUSSEX PO22 9BY

QTY	ITEM	ITEM PRICE	TOTAL
	INTERFACE MODULE II	20.95	
	JOYSTICK(S)	7.54	
	SOFTWARE AS TICKED ON LIST		
	SOFTWARE AS TICKED ON LIST		
ZX81 ☐	ZX SPECTRUM ☐ Please tick	FINAL TOTAL	

DEALER ENQUIRIES WELCOME *EXPORT PRICES ON APPLICATION*

THE THOUGHT PROCESSOR

USE AND LEARN

"Excellent"
. . . ***Sinclair User.***

"Well-presented book . . . excellent music composer . . . useful routines . . . novel and interesting games. . ."

THE DATABASE

"Excellent"
. . . ***Sinclair User.***

"Simple to understand and will have users storing information in a matter of minutes. . ."

THE SPREADSHEET

"Excellent"
. . . ***Sinclair User.***

"Closely resembles Visicalc for the Apple but is less than one tenth of the price. . ."

"Can be used in business and the home. . ."

"Much clearer (than Vu-calc) . . ."

MiCROL

"Quality"
. . . ***Sinclair User.***

THE THOUGHT PROCESSOR

MiCROL©

SERIOUS SPECTRUM SOFTWARE only £9.95 each!

USE AND LEARN

Your perfect Spectrum starter Kit. 25 original BASIC programs you can use immediately, PLUS 118 page manual to help you get the most from your 16 or 48K Spectrum. 25 programs include: Music Composer, World Atlas, Computer Term Glossary, Screen Designer, Star Maps – PLUS games and powerful routines to use in your own programs: graph-drawing, text-editing, sorting, searching and much more. 118 page manual includes detailed description of programming techniques, full listings of all programs, and articles to develop your own program-writing skills.

"Excellent" A.R. West, Surrey. "First-time loading, user-friendly, superb documentation" J.E. Mann, Leeds.

THE DATABASE

Whether you want to update mailing lists, manage customer accounts, or simply produce an index of your record collection, THE DATABASE makes it easy and enjoyable. A breakthrough in power *and* practicality, THE DATABASE allows you to store information on any subject in the way *you* want, and gives you a full range of commands to display, update, sort, search and print – even perform calculations. Massive storage capacity: 1,000 lines in memory at a time, over 7,000 names and addresses on a single C90 cassette. See for yourself why THE DATABASE is the most advanced 48K Spectrum database available – far more powerful *and* practical than Sinclair's VU-FILE and all other "competitors".

THE SPREADSHEET

Based closely on Visicalc, the world's best-selling program, THE SPREADSHEET turns your 48K Spectrum into a "super-Calculator" that helps you solve all kinds of number-based problems quickly and easily. Hundreds of applications in business, engineering and science – and just as versatile for home finance management. Invaluable in education too, helping develop maths ability and confidence. In power, flexibility and ease of use, THE SPREADSHEET outperforms all other Spectrum spreadsheets – including Sinclair's VU-CALC. See for yourself, with the security of MiCROL'S 14 day money-back Guarantee.

THE WORD PROCESSOR

The only full feature, professionally-written word processor for 48K Spectrums. Use it to produce memos, letters, reports – THE WORD PROCESSOR has the features you need, including flexible editing, justification, centering, and automatic "word wrap". Simplicity itself to use, THE WORD PROCESSOR uses the same "what you see is what you get" principle as word processors costing hundreds of pounds more. 20,000 character storage capability for real-work applications, and it's easily adapted to work with full size printers. Once again, MiCROL sets the standard in serious Spectrum software.

To order: Simply complete the coupon, and FREEPOST with your cheque, made payable to MiCROL (UK Mail Order). All products normally available from stock and despatched by return. Credit Card Orders: By phone 9-5.30 Mon to Sat. stating name and address, Card No. and item(s) required.

MiCROL

31 Burleigh Street, Cambridge CB1 1BR.

(0223)312453

Post to:– MiCROL (UK Mail Order) Freepost
31 Burleigh Street, Cambridge CB1 1BR

Please send me.....copy/copies of USE AND LEARN Vol. 1
Please send me.....copy/copies of THE DATABASE
Please send me.....copy/copies of THE SPREADSHEET
Please send me.....copy/copies of THE WORD PROCESSOR

I enclose cheque/P.O. for.....(£9.95 + 50p p+p – £10.45 total each)

Or I wish to pay by Access/Barclaycard/Visa
Card Number .....

Please print name and address

Name .....

Address.....

.....

.....

Credit Card
holder's signature SU4

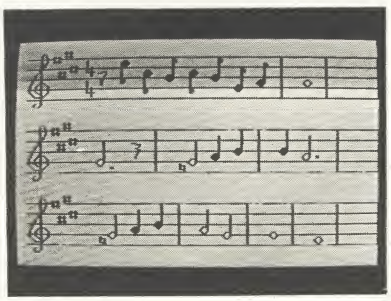
MUSIC MAKER

NEW

FOR 48K SPECTRUM

PLAY AND COMPOSE MUSIC

- Real musical notation
- Easy to use
- 11 major keys

£5.75

FOR EXPERTS AND BEGINNERS

To: Bellflower Software, 6 Rosewood Avenue, Greenford, Middlesex

Please send me ..... Music Maker cassette(s). I enclose a cheque /postal order for £ ..... payable to Bellflower Software.

Name .....

Address .....

.....

su1

GAMES FOR 16K SPECTRUM

SUPERPLAY-1 £5

by William Smith

Five different games, some of them entirely original, which should appeal to fourteen year olds of all ages!

Using a combination of BASIC and machine code – for extra zip this cassette contains the following:

KONGO Move your man along girders and up ladders to reach the terrible kongo. Avoid the deadly patches of red jelly and watch out for kongo's patrolling warriors.

ROBOT RESCUE Guide your ship through a meteor storm to reach the landing pad and bring the stranded astronaut back to the mother ship.

HIGHWAY RUNNER Get your family of frogs safely across the M1.

BIG GAME HUNTER Shoot the advancing hordes of wild lions and rhinos.

UFO Protect your planet from the aliens with their deadly torpedoes. Be sure you don't exhaust your supply of lasers.

ALL FIVE GAMES FOR £5.

All games feature high score and on-screen score total.

SOLO-WHIST £5

by J.A. Yates

This is an excellent simulation of the well known card game and makes a fascinating change from the usual arcade type computer game.

The computer deals the cards and you play your hand against three opponents who are controlled by the computer.

A running total of tricks won is kept on the screen and you have to use considerable skill to beat the computer.

The graphics are of a high standard and you will soon forget that you are using a computer and you will become absorbed in the battle of wits with your three hard bitten opponents.

VIDEO
SOFTWARE LIMITED
STONE LANE, KINVER, STOURBRIDGE,
WEST MIDLANDS DY7 6EQ, ENGLAND
TEL: KINVER 2462 STD 038 483 2462

TRANSFORM LTD.

ZX Business Software.

FOR SMALL BUSINESSES AND THE SELFEMPLOYED

BUSINESS BANK ACCOUNT: this program enables you to make debits uder 11–15 subheadings. Statements include totals of all subheadings.
ZX 81 £8.75 ZX SPECTRUM 48K £10.75

SALES DAY BOOK: for all your invoices this program will enable you to prepare statements of outstanding invoices. Program will also calculate VAT.
ZX 81 £8.75 ZX SPECTRUM 48K £10.75

PURCHASE DAY BOOK: keeps a complete record of all your purchases under 11–15 subheadings. This program will also calculate and deduct VAT.
ZX 81 £8.75 ZX SPECTRUM 48K £10.75

● All the programs have full search facilities ●

BUSINESS PACKS: including Bank Account, Sales, Purchase & Quarterly Analysis programs.
ZX 81 £25.00 ZX SPECTRUM 48K £30.00

★ NEW ★

STOCK CONTROL: handles 900 lines, includes details of supplier. Program has full search facilities enabling you to search & update all lines from one supplier.

ZX SPECTRUM 48K £10.75

Please specify memory size when ordering for your ZX 81 or ZX SPECTRUM
All prices include VAT post & packaging, for details send SAE to:

TRANSFORM LTD Dept. SU
41 Keats House, Porchester Mead Beckenham, Kent.
Tel: 01–658 1661.

Insurance Scheme for Personal Computers

BREAKDOWN AND ACCIDENTAL LOSS OR DAMAGE

Covering personal computers and all periferals dedicated exclusively for use with personal computers. All this equipment is insured in private houses, educational establishments, temporarily in offices.

The computer must be less that two years old when it is first insured.

The annual premium if you live anywhere in the U.K.

Value of Equipment	Annual Premium
£100	£ 7.50
£200	£ 9.75
£300	£11.50
£400	£13.75
£500	£15.00
£750	£23.50
£1000	£32.50

For full details and an application form complete the coupon and send to Graham Brown & Co. (Guildford) Ltd.
For phone enquiries contact Mr C C Bower or Mr J C Austin.

Name .....
Address .....
.....

Graham Brown & Co. (Guildford) Ltd.
Registered Insurance Brokers
Pannells Court, Guildford, Surrey GU1 4EY Tel: (0483) 65651

MEMBERS OF THE BRITISH INSURANCE BROKERS' ASSOCIATION

BIGGER★BETTER

Sutton

MICRO SHOP

ZX81 • ZX SPECTRUM •

DRAGON 32 • VIC-20 • BBC

The very best mail order items available
"over the counter"

Games, Keyboards, Serious Programs, Rams,
Books, Peripherals and much, much more!

FAST MAIL ORDER SERVICE PHONE **01-769 2887**
WITH ACCESS/VISA (24hr Ansafone)
or send large S.A.E. for catalogue (state which computer)

Open 10.30 — 5.30 Tues. to Sat. (closed Mondays)
310 STREATHAM HIGH ROAD, LONDON SW16

ZX SPECTRUM & ZX81 EDUCATIONAL SOFTWARE

Spectrum Junior Education **£5.50**

Use your Spectrum to help your children with their school work. This cassette contains eight attractive, easy-to-use programs for the 7 to 11 age group.

* Topics include English comprehension, spellings, homophones, junior science, maths and history.
* Entering your own questions and answers allows you to adapt two of these programs for exercises in any subject area.
* Moving colour graphics and sound are extensively used to improve motivation.
* Use the "draw" programm to produce pictures, maps and diagrams.

Suitable for the 16K or 48K Spectrum. Program notes are supplied.

O-Level Chemistry (C1) **£5.50**

This cassette contains four clearly presented revision/tutorial programs. The subject matter has been carefully structured to cover the most important aspects of:

* Elements, compounds and mixtures.
* Structure, bonding and properties.
* Redox, electrolysis and the activity series.
* Acids, bases and salts.

48K Spectrum and 16K ZX81 versions of the cassette are available. Please specify which you require.

Professional Computer Assisted Learning materials from:

CALPAC COMPUTER SOFTWARE
108 Hermitage Woods Crescent, St Johns,
Woking, Surrey GU21 1UF.

Overseas orders: £6.50 ($11.60) per cassette; includes AIRMAIL postage.

If you're a *serious* Sinclair user — why don't you stop playing games?

If you need a new challenge that does'nt involve saving the universe from destruction, beating off green monsters or flying a spaceship — we can bring you down to earth with stimulating, practical projects for the ZX81 and Spectrum in **Sinclair Projects** magazine!

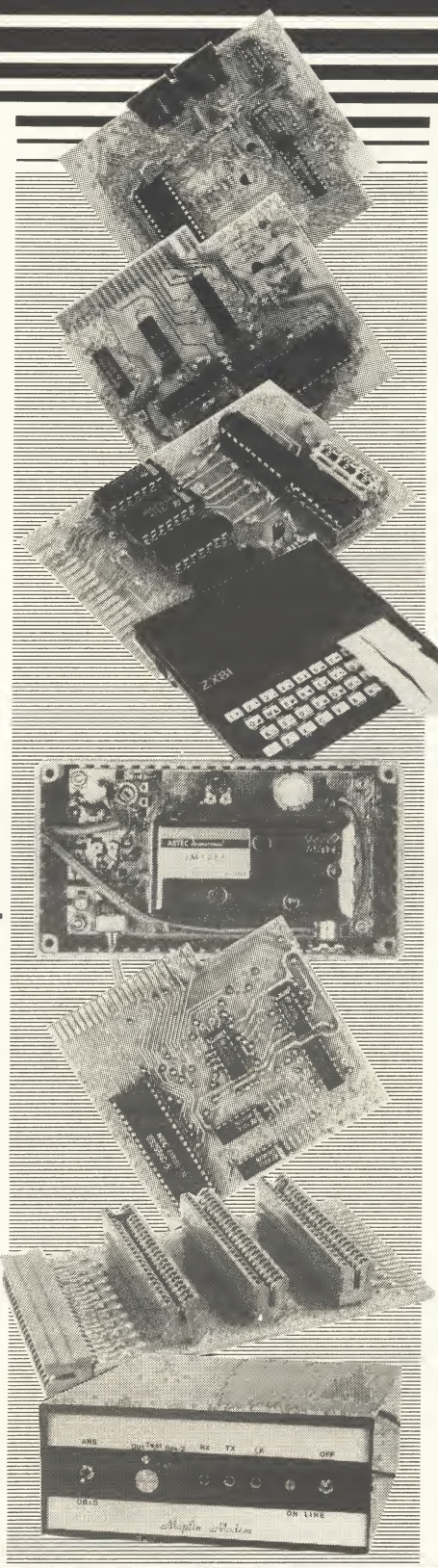
In recent issues we have shown how to use your Sinclair for controlling your central heating . . . improving the graphics . . . build a printer interface . . . and many more ideas that tax your ability and ingenuity.

Sinclair Projects is published every two months as a glossy, instruction-packed magazine that gives you all the encouragement you need to exercise your talent and take a serious look at what your Sinclair can do for you.

Each issue can contain as many as FIVE step-by-step projects — yet it's yours for JUST 95p. So if you want a break from playing games, make sure you order YOUR **Sinclair Projects** from your newsagent today — or fill in the form below and we will send it direct to you, six times per year.

Mail to: ECC Publications Limited: 30-31 Islington Green, London N1 8BJ Yes — I'd like to subscribe to Sinclair Projects (6 issues — price £6.60 including P&P) I enclose a cheque for £ _____
Please charge my credit card: Card name _____ Number _____
Name _____ Address _____
Signature _____ Date _____
NB This offer applies to UK subscribers only. Overseas rates available on request.

EXCITING ADDITIONS FOR YOUR HOME COMPUTER



THE MAPLIN TALK-BACK for ZX81 and VIC20

Now your computer can talk

★ Allophone (extended phoneme) system gives unlimited vocabulary.
★ Can be used with unexpanded VIC20 or ZX81 — does not require large areas of memory.
★ In VIC20 version, speech output is direct to TV speaker with no additional amplification needed.
★ Allows speech to be easily included in programs.

Complete kits. Order As:
LK00A (VIC20 Talk-Back). Price £24.95.
LK01B (ZX81 Talk-Back). Price £19.95.
Full construction details in Maplin Projects Book 6. Price 70p. Order As XA06G.

SOUNDS GENERATOR FOR ZX81

3-Programmable tone generators with programmable attenuators turns your ZX81 into a mini-synthesiser.
Noise generator with 3 pitch levels enables the creation of most special effect sounds.
Single address access via BASIC with PEEK and POKE. Connects directly to expansion port socket or motherboard.
Complete kit. Order As LW96E. Price £10.95.
Full construction details in Maplin Projects Book 5. Order As XA05F. Price 70p.

ZX81 INPUT/OUTPUT PORT

Two bi-directional ports for a total of 16 input or 16 output lines.
Includes one buffered output which can interface directly to CMOS.
On board address selection allows for expansion to 6 ports with two boards.
Complete kit. Order As LW76H. Price £9.25.
Full construction details in Maplin Projects Book 4. Order As XA04E. Price 70p.

MODEM

A CCITT standard modem that connects directly to your telephone line via a B.T. approved transformer. Transmits and receives simultaneously on European standard frequencies at 300 baud. May be used to talk to any other 300 baud European standard modem including the Maplin Computer Shopping modem on 0702 552941 and any British Telecom Datel 200/300 Service modem.
The modem's computer interface is RS232 compatible.
A complete kit excluding case is available. Order As LW99H. Price £39.95.
Full construction details in Maplin Projects Book 5. Order As XA05F. Price 70p.

KEYBOARD with ELECTRONICS for ZX81

★ Full size, full travel keyboard that's simple to add to your ZX81 (no soldering in ZX81).
★ Complete with electronics to make "Shift Lock", "Function" and "Graphics 2" single key selections.
★ Powered (with adaptor supplied) from ZX81's own standard power supply.

Full details in Project Book 3 (XA03D). Price 70p
Complete kit (excl. case) £21.90.
Order As LW72P.
Case £4.95. Order As XG17T.
Ready built-in case £29.95.
Order As XG22Y.

ZX81 TV SOUND

ZX81 sound on your TV set.
Video reversing switch for normal or inverse video display. Can be used with the Talk-Back or Sounds Generator kits.
Complete kit. Order As LK02C. Price £19.95.
Full construction details in Maplin Projects Book 6. Order As XA06G. Price 70p.

ZX81 EXTENSION BOARD

Our ZX81 Extendiboard plugs directly into the ZX81 expansion port and will accept a 16K RAM pack and three other plug-in modules simultaneously. Parts are sold separately as follows:
PCB Order As GB08J. Price £2.32.
Edge Connectors (4 needed) Order As RK35Q. Price £2.39 each.
Track pins (1 pack needed). Order As FL82D. Price 85p per pack of 50.

INTERFACES for MODEM

Interfaces for most popular home computers which do not have RS232 ports will be available shortly. An interface for the ZX81 that includes a complete Machine Code Communications Program is available. Order As LK08J (ZX81 Modem Interface Kit). Price £24.95.
Full construction details in Maplin Projects Book 7. Order As XA07H. Price 70p.

MAPLIN

Maplin Electronic Supplies Ltd., Mail Order: P.O. Box 3, Rayleigh, Essex SS6 8LR.
Tel. Southend (0702) 552911 (Sales).

159-161 King St., Hammersmith, W6. Tel. 01-748 0926. 284, London Road, Westcliff-on-Sea, Essex. Tel. (0702) 554000. Lynton Square, Perry Barr, Birmingham. Tel. (021) 356 7292.
All prices include VAT & carriage. Please add a 50p handling charge to orders under £5 total value.

Please explain arrays for us woodenheads

This month our expert correspondent, Andrew Hewson, deals with some fairly straightforward software queries before attempting to explain something more complicated about machine code routines

BY ANSWERING a few fairly straightforward software questions and then finishing with a reasonably lengthy machine code routine for those who like that type of thing, I have tried this month to provide something of interest to everyone. Peter Bankes of Debenham asks: **Is it possible to poke the Spectrum to get caps lock?**

The caps lock condition is stored in bit 4 of FLAGS2 at address 23658 in the system variables area. When bit 4 is set, all entries will appear in capitals. Hence a program can determine whether caps lock is set by checking the status of that bit and altering it if required.

The condition of bit 4 may be checked from Basic in a somewhat cumbersome fashion as illustrated by:

```
10 IF INT(PEEK 23658/8)=2*INT
   (INT(PEEK 23658/8)/2) THEN
   PRINT "CAPS LOCK NOT
   SET": GOTO 30
20 PRINT "CAPS LOCK SET"
30 STOP
```

To set bit 4 from Basic and hence turn on the caps lock enter

```
POKE 23658, PEEK 23658+8
```

To turn it off again, enter

```
POKE 23658, PEEK 23658-8
```

Alternatively you may wish to use the ROM routine which "toggles" the caps lock. The routine is located at address 4317 (10DD hexadecimal) and successive calls of the form

```
RAND USR 4317
```

turn the caps lock on and off.

Peter Hollis of Newcastle has another problem concerning the Spectrum. He writes: **I have seen a number of program listings which have user-defined graphics characters embedded within them but with no accompanying explanation of how the characters are formed. I have no idea of how to reproduce them on my machine. Can you help?**

The 21 user-defined graphics characters available on the Spectrum are accessed by entering SHIFT 9 followed by one of the 21 letters A to U followed by SHIFT 9. When the Spectrum is turned-on the 21 characters are set to copies of the appropriate letter and so entering SHIFT 9 before and after pressing a letter key makes no apparent difference to what is displayed. Thus the command

```
PRINT "A"
```

causes a letter A to appear in the top left-hand corner of the screen, regardless of whether the SHIFT 9 is entered before and after the letter A.

If the user-defined graphics character assigned to the "A" key is re-defined the new character will always subsequently be used. The new character will appear at the appropriate time when the program is executed and it will also appear in listings of the program, both on the display and on the Sinclair printer.

Hence there is a problem when programs are published, because the new characters are shown in the listing with no reference to the key to which they are assigned.

A possible solution is to study the listing to try to deduce which keys have been used. Usually the author includes a loop into his program of the form:

```
10 DATA 0,12,14,4,60,124,60,0
20 FOR I=0 to 7
30 READ A
40 POKE USR "D"+I,A
50 NEXT I
```

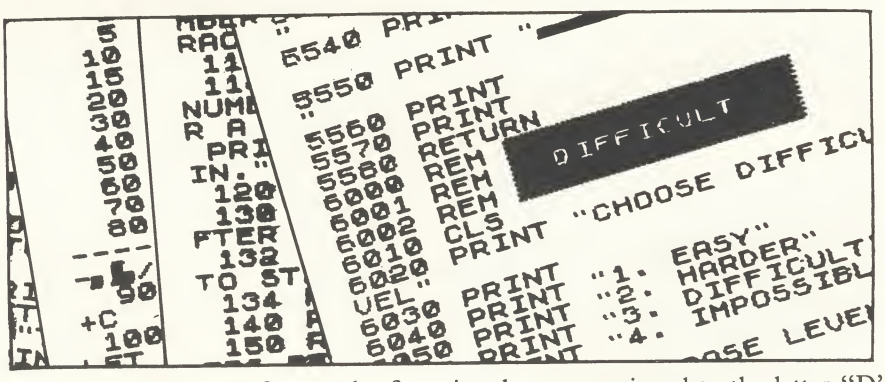
Such a loop reads the eight values in turn which are used to define the shape of the new character, from the DATA statement into the variable A and then POKE them into the relevant locations in memory. In this case it is the graphics character assigned to the letter "D" which is being re-defined.

If you can locate similar loops in the problem program you can identify which keys have been used. You can then RUN the program, BREAK into it, and then press the keys in turn — preceded and followed by SHIFT 9 — to discover which shape has been assigned to which key.

Unfortunately there are several ways

continued on page 102

● *Please address problems and queries to Andrew Hewson, Helpline, Graham Close, Blewbury, Oxfordshire.*



continued from page 101

of re-defining graphics characters, that technique being one of the simplest. Therefore you may not be able to determine which keys have been used, in which case trial and error using the keyboard is your only remedy.

John Brookes of Bromsgrove bought his first home computer — a Spectrum — and read several books on the machine but he is having difficulty with the concept of an array. He writes: **The books are generally easy to read but none of them explains arrays sufficiently clearly for us wooden-headed types. Can you help?**

Most tasks performed by computers comprise reading information into memory, manipulating the information according to a program of stored instructions, and writing the information out of memory.

The information stored in memory must be organised in some convenient fashion so that the person who writes the program of instructions can do his job. Most high-level languages allow the programmer to declare variables of various kinds so that different types of information can be stored and treated in appropriate ways.

The ZX-81 and the Spectrum each allow six types of variables — numeric with a single character name; numeric with a multiple character name; control for a FOR-NEXT loop; string; string array; numeric array.

The first two types are identical in use, as they can each store only a single positive or negative number. Most programmers try to give a name to a variable which reminds them of the information it holds. For example, a bank account program might hold the current balance in a variable called BALANCE.

```
 10  PRINT AT 0,11;"CHEQUEBOOK"
 20  PRINT AT 2,0;"ENTER CURRENT
     BALANCE"
 30  INPUT BALANCE
 40  DIM C(30)
 50  PRINT AT 2,0;"ENTER EACH
     CHEQUE IN TURN"
 60  FOR I=1 to 30
 70  PRINT AT 4,0;"CURRENT
     BALANCE= ";BALANCE
 80  INPUT C(I)
 90  LET BALANCE=BALANCE-C(I)
100  NEXT I
110  CLS
120  PRINT "CHEQUE NO.","VALUE"
130  FOR I=1 TO 30
140  PRINT I,C(I)
150  IF PEEK 16442-3 THEN SCROLL
160  NEXT I
```

Table 1. A simple cheque book program.

In many programs similar information is to be stored concurrently and in that situation the program is also likely to become unnecessarily cumbersome because the same operation must be performed on many variables, each with a different name and therefore requiring a separate piece of code.

The bank account program might be required to store the amount spent using each of 30 cheques in a cheque book. The amount spent using the first cheque could be stored in a variable called CHEQUE. The same variable could not be used to store the value of the second cheque because only one value can be stored in a numeric variable.

The act of entering the second value "over-writes" the first value, causing it to be lost, hence the programmer must think of a new name for the second cheque. Most programmers would run out of inspiration long before they had named all 30 cheques.

One way of naming all 30 which would not require too much effort would be to call them CHEQUE1, CHEQUE2, CHEQUE3. That is the idea of an array. Sinclair arrays are restricted to single-character names only but that is a small price to pay for the flexibility they provide.

Table one shows a simple cheque book program which uses an array, C, of length 30 to hold the value of each cheque as it is entered. The program also shows the use of another variable, I, to count through the array selecting each element of the array in turn. When all the cheques have been entered the program prints the value of each in turn.

Simon Smith of Battersea, London has a more complex question concerning arrays. He writes: **I have a ZX-81 and recently bought a 64K memory to replace the 16K RAM pack I had previously. I now want to enlarge the array in a program which indexes my record collection to make use of the extra memory space. Is there any way of doing so, short of copying the data to another array?**

Defining a new array and copying the data across using a FOR-NEXT loop would certainly be the easiest way of dealing with the problem. The disadvantage is that the new array can occupy only the space which is not used by the old array; hence when the old array is deleted — by DIMensioning it to zero — the memory space it occupies remains unused. If the old array was 12K bytes long and a further 32K bytes of memory was added, the new array could occupy only 32K of the total of 44K bytes available.

There is no Basic command to make an array grow to fill the remaining memory space and so I have written the machine code routine listed in table two to do the job. The routine can be loaded into a REM statement forming the second line in a ZX-81 program using a hexadecimal loader. For example:

```
10 REM XA$
20 REM AT LEAST 108 CHARAC-
TERS
30 FOR I=16523 to 16630
40 INPUT Z$
50 IF Z$="S" THEN STOP
60 PRINT Z$;"  ";
70 POKE I,16*CODE Z$+CODE
Z$(2)-476
80 NEXT I
```

To load the machine code routine, run the loader and enter each pair of hexadecimal codes in turn. Be very careful not to make mistakes because the program makes no error checks.

To use the routine to double the size of a string array called A$ make the first program line a REM statement containing an 'X' followed by the name of the array, i.e., A$ as in the loader. Then POKE the factor by which you want the array to grow into the first byte of the REM statement. In that case the array is to grow by a factor of two so you should enter:

```
POKE 16514,2
```

Then call the machine code routine by entering:

```
RAND USR 16523
```

Both the total length of the array and the size of the first dimension will grow by the factor specified at address 16514.

The routine makes a number of error checks. It will detect if the named variable does not exist or is not an array. It also ensures that there is sufficient room in RAM to enlarge the array by the factor specified.

The routine makes use of two ROM routines. The first is LOOKVARS

which is located at 4380 decimal — 111C hexadecimal. That routine finds the location in the variables area of the variable pointed to by CH-ADD and returns the address in the HL register pair. The second ROM routine, MAKE SPACE, inserts BC bytes at the address pointed to by HL.

The operation of the routine can be checked by adding the following lines to the hexadecimal loader:

```
1000 DIM A$(2,3)
1010 LET A$(1)="ABC"
1020 LET A$(2)="DEF"
1030 GOSUB 2000
1040 POKE 16514,2
1050 RAND USR 16523
1060 GOSUB 2000
1070 STOP
2000 LET W=PEEK
16400+256*16401
2010 FOR I=W TO W+21
2020 PRINT I,PEEK I
```

```
2030 NEXT I
2040 PAUSE 32768
2050 CLS
2060 RETURN
```

Execute the test program by entering:

```
RUN 1000
```

The program declares an array A$ and PRINTs the contents of the first 22 bytes of the variables area where the array is held. The user can note the contents of the display and compare it to the format of an array as shown on pages 173 and 174 of ZX-81 Basic Programming.

The program then doubles the size of the array and displays the first 22 bytes again. The user will see that the total length of the array has increased appropriately and that the size of the first dimension has doubled.

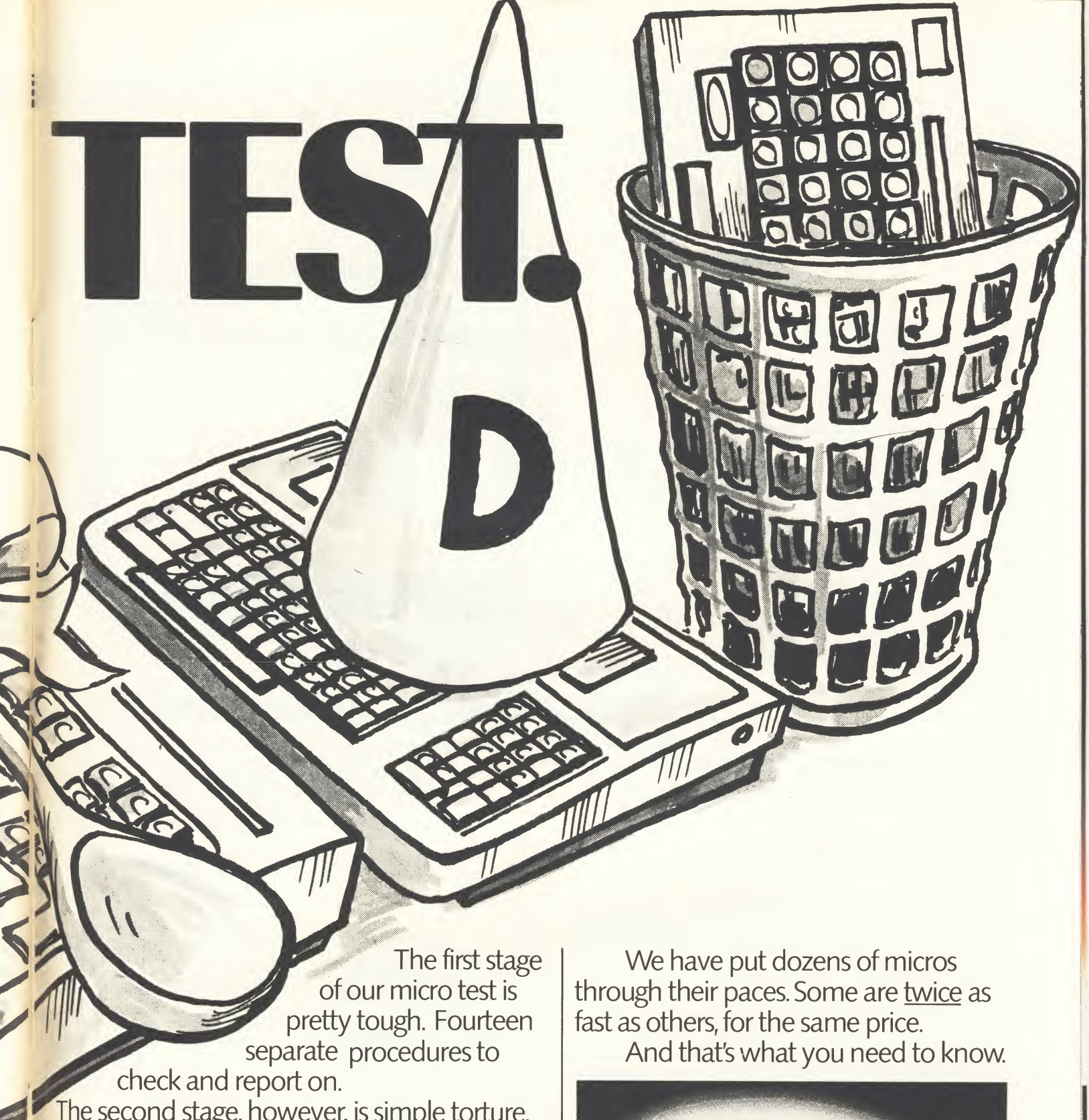
With a little care the routine can be adapted to run on the Spectrum. The ROM routines LOOKVARS and MAKE SPACE are located at 10418 and 5717 respectively — 28B2 and 1655 in hexadecimal. CH-ADD is at 23645 — 5C5D hexadecimal. It is also necessary to alter the addresses at which the scale factor and the name of the array are stored.

Table 2. A ZX-81 routine to enlarge an array dynamically.

Hex code	Assembler code	Comment
3A 82 40	LD A,(16514)	Return if
FE 01	CP 1	parameter
D8	RET C	is zero.
21 83 40	LD HL,16515	Set CH-ADD.
22 16 40	LD (16406),HL	
CD 1C 11	CALL LOOKVARS	Find array.
D8	RET C	Return if
C0	RET NZ	numeric.
7E	LD A,(HL)	Return
FE 80	CP 128	if
D8	RET C	string.
23	INC HL	Set A to
23	INC HL	number of
23	INC HL	dimensions.
7E	LD A,(HL)	
CB 27	SLA,A	Multiply by
06 00	LD B,0	two and
CB 10	RL B	add one,
3C	INC A	transfer
4F	LD C,A	to BC.
2B	DEC HL	HL points to
56	LD D,(HL)	length.
2B	DEC HL	DE is
5E	LD E,(HL)	old length.
E5	PUSH HL	Save.
D5	PUSH DE	
EB	EX DE,HL	Set DE
A7	AND A	to old
ED 42	SBC HL,BC	data length.
EB	EX DE,HL	
21 00 00	LD HL,0	Calculate
3A 82 40	LD A,(16514)	new data
A7	AND A	length.
19	ADD HL,DE	
38 33	JR C,51	Jump on overflow.
3D	DEC A	
FE 00	CP 0	
20 F8	JR NZ,-8	
09	ADD HL,BC	Set HL to
38 2B	JR C,43	new length.
D1	POP DE	
E5	PUSH HL	
A7	AND A	
ED 52	SBC HL,DE	Set BC to
44	LD B,H	increase
4D	LD C,L	in length.
E1	POP HL	
E3	EX (SP),HL	Set HL to
E5	PUSH HL	address of
19	ADD HL,DE	end of array.
23	INC HL	
CD 9E 09	CALL MAKE SPACE	Enlarge array.
E1	POP HL	
D1	POP DE	
73	LD (HL),E	Insert new
23	INC HL	length.
72	LD (HL),D	
23	INC HL	
23	INC HL	
4E	LD C,(HL)	Set BC to
23	INC HL	first
46	LD B,(HL)	dimension.
11 00 00	LD DE,0	Calculate
EB	EX DE,HL	new first
3A 82 40	LD A,(16514)	dimension.
09	ADD HL,BC	
3D	DEC A	
FE 00	CP 0	
20 FA	JR NZ,-6	
EB	EX DE,HL	
72	LD (HL),D	Store new
2B	DEC HL	first
73	LD (HL),E	dimension.
C9	RET	
E1	POP HL	If overflow
E1	POP HL	then return.
C9	RET	

THE ACID

TEST.

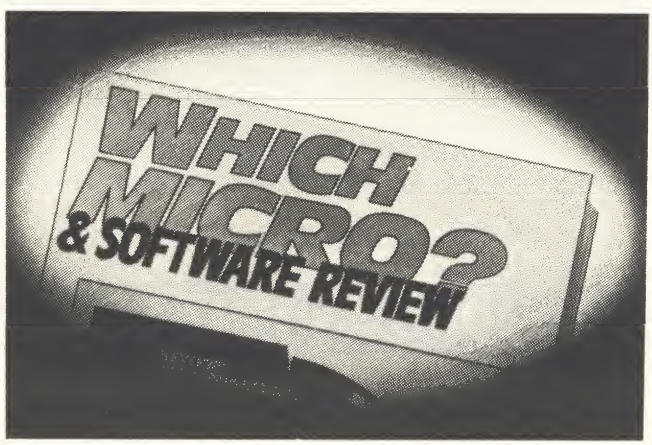


The first stage of our micro test is pretty tough. Fourteen separate procedures to check and report on.

The second stage, however, is simple torture. We have devised eight programs which make any micro sweat. The routines gradually become more complicated. They start with simple speed-related counting, through loops, numeric calculations, variables and constants, sub-routine calls, finishing with a dimension statement. Then we test arrays and, finally, sines and logs.

We have put dozens of micros through their paces. Some are twice as fast as others, for the same price.

And that's what you need to know.



WHEN WE TEST A MICRO, IT STAYS TESTED.

MICROSPHERE

MICROSPHERE COMPUTER SERVICES LTD
72 ROSEBERY ROAD · LONDON N10 2LA
TELEPHONE 01-883 9411

EVOLUTION (48K Spectrum)
Can you: Trace the course of evolution?
Start with primaeval soup & end up with man?
Survive the odd major disaster?
Should be easy. . . after all it's been done before!
Only £6.95

OMNICALC (48K Spectrum)
The best spreadsheet analysis program you can buy for the Spectrum. Uses include financial planning, home budgets etc.
Features: 99 columns or 250 rows
Fully prompted input
Extensive repeat facilities
Conditional expressions and RND
Totalling and sub-totalling
Comprehensive manual
£9.95

ZX-SIDEPRINT (For Spectrum or ZX81)
Print sideways on the ZX-Printer to give proper 80/132 etc.character print lines.
Easy to add to existing programs
Routines to take print lines direct from screen
Lower case letters even on a ZX81!
(State version req'd) £4.95

CREVASSE & HOTFOOT (16K Spectrum)
2 original games from Microsphere
Can you make it across the ice-cap whilst chasms open and close all around?
Help the rabbit get to fields full of carrots - but remember: the plumper the rabbit, the greater the danger.
Excellent value £4.95

Print-out Rolls for your ZX printer

£10.95 per 6 rolls

inclusive of VAT, postage and packing (U.K. prices only).
Quantities of 50 plus for schools and computer clubs, prices on application.
Cash with order to:

Guildhall Computer Stationery Limited

The Drill House · Street Road · Glastonbury · Somerset BA6 9EF
Telephone: (0458) 34122

GCSL

ZX81-16K/DRAGON 32/BBC A+B
SPECTRUM 16/48

ADVENTURE 200 (16k)

OVER 200 PLACES to explore. Written in machine code and using advanced data compression techniques it squeezes a true fixed-map adventure into just 16K – all held in ram – no extra cassette reads or books of text. Unlike a randomly generated maze type game this is a real test of your tactical skill. It starts easy but the further you progress the more dangerous and difficult the problems become as you use objects around you to overcome obstacles and evade enemies! More like a thriller than an arcade game – and you are the hero! Flexible command format allows abbreviations and multiple word lines.
Other games from Foilkade include:-
AWARI – Ancient African game of logic
FANTASTIC VOYAGE – (ZX81 16K only) Real-time simulation of micro-sub in human body. Real vascular map and fast m/code graphics.
THE FOILKADE CHALLENGE: Buy both Adventure and Awari and enter our prize competition. SAE for details.

All games £5.95 inc. 2 for £9.95 3 for £13.95

£1000 IN PRIZES

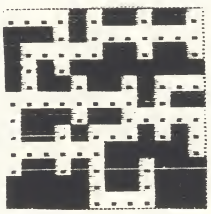
FOILKADE LTD

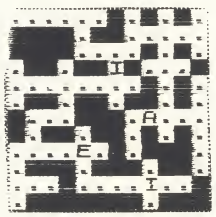
'SU5' 66 LITTLEDEAN, YATE, BRISTOL BS17 4UQ

WORDfit 16K ZX81

(written entirely in machine code)

THE PROGRAM SETS THE PATTERN YOU KNIT THE WORDS





1. Program will not allow you to input the same word twice.
2. Cell pattern set at random.
3. Choice of 4 square sizes.
4. Copy screen at any time.
5. Rub out entire square, part of word, whole word or last letter.
6. Can instruct program to insert vowels.
7. Statistical analysis on screen continuously.

£5

RAM WRITER,
3 VUMBA HOUSE,
2 CEDAR GARDENS,
SUTTON,
SURREY SM2 5DB

Quentin Heath returns to Middle Earth with the help of some readers and discovers ways of getting nearer his golden goal

Ringing success for the Hobbit hunters

I DID NOT realise that the response from The Hobbit article two months ago would be so great. The game has caused so much interest that I have decided to devote this month's column to how readers are coping with this adventure.

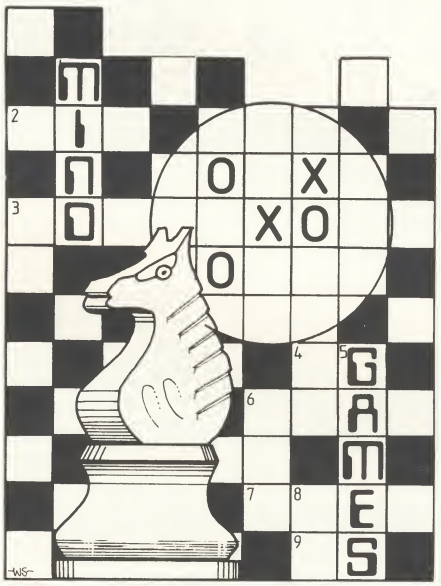
First, however, I would like to digress to tell you something which I discovered about the Spectrum when playing this and other machine code games. Most machine code games use a Basic loader program to load code.

Usually if you use LOAD and try to break out of it, the system is designed to crash. If, however, you use MERGE instead of LOAD, the computer will stop after the Basic loader has been entered and will not auto-run the machine code. There are ways to circumvent this, for instance loading machine code straight into the system, but software manufacturers should be warned of the danger.

Back to The Hobbit. One reader, John Hardman of Welling, Kent, claims to have finished the adventure. He sent me a copy of the last frame of the game to prove it. The next highest score attained during play so far is 67.5 percent by Dave Newton of Bolton, Lancashire. He says that he found no pitfalls in Beorn's house. I know of five people who have fallen in the shape changer's happy home.

> 'It is better to kill Gollum as soon as you see him. If you do not he may slip through your fingers'

Dr Paul Holmes of Middlesbrough sent a map of part of the game. He has not had much luck with Gollum and the ring and asks what is the answer to the first riddle. It has always been my policy to kill dumb animals in adventures and this is no exception. It is better to kill Gollum as soon as you see him. If you do not he may slip through your fingers or you could be choked by his.



Holmes also wants to know what is the goblin's cache and where it can be found. To find it you will have to be captured and put into the goblins' dungeon. You will find some sand on the floor.

If you DIG you will find a trapdoor. Hobbits are not strong animals, so ask Thorin several times to SMASH or BREAK the trapdoor. When it is broken you will find the cache in a hole beneath it. I am not giving away all the secrets, however, and you will have to decide what to do with it.

In the March issue I stated that several people were having difficulties when they got through the barrels and tried to go through the trap door in the Elven King's cellar. That happened to me and I have now found that unless you have the ring on your finger the program may crash. That means you will have to go through the goblins' tunnels before attempting to get into the barrels and rolling through the trapdoor.

I have found what may be a bug in the program when typing entries into the computer. Reader Hardman, who claims to have finished The Hobbit, warned me about the potential problem. Try typing DO in reply to the program prompt. The program seems to read a variety of responses and put them all on the screen. If you type-in DOW, according to Hardman, your program could crash.

With the help of reader Colin Appleyard I have found the golden key in the Misty Mountains. His instructions are to go north from the Misty Mountains, then north-east, north, south-east, down three times until you are in the misty valley, then east, take the key, up, west, north and you are back on the mountain again.

I have no doubt that The Hobbit will recur in a future article and I would still like to hear from you if you have been playing the game. Next month I shall be looking at Dungeon Master from Crystal.

Hints and tips

Kill Gollum if the ring you find,
His riddles will only fog your mind.

A rope is as good as a boat.

If with your sword at the web you hack,
You'll find yourself defenceless against attack.
If when you finish you retreat to the east,
Just be prepared or you'll be deceased.

•*If you have views on any mind games or if you have hints and tips on adventure games, computer-moderated games, chess, or anything along those lines you can contact me. I will also try to answer any questions which you may have. The address is:*

Quentin Heath, Mind Games, c/o *Sinclair User,* ECC Publications, 30–31 Islington Green, London N1 8BJ.

Northern Premier Exhibitions

proudly announce a

ZX and SPECTRUM FAIR at

SHEFFIELD

MAY 21st STARS DISCO, QUEENS ROAD, SHEFFIELD.
(NEXT DOOR TO ICE RINK
½ MILE FROM CENTRE).

* * * * *

A BRAND NEW SPECTRUM TO BE WON.
TICKETS 25p.

* * * * *

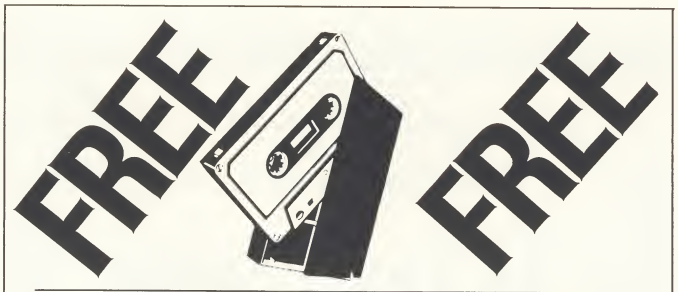
FOR TABLES CONTACT MIKE DONNACHIE
0532-552854 AFTER 4 p.m.
16 SOUTH PARADE, PUDSEY,
WEST YORKSHIRE.

* * * * *

Adminsion — ADULTS 75p, CHILDREN 50p.
10 a.m. till 5.00 p.m.

HARDWARE, SOFTWARE, BOOKS AND MAGAZINES — EVERYTHING FOR ZX USERS.

THIS FAIR IS EXCLUSIVELY FOR ZX COMPUTERS.



Top quality, super Ferick low noise, C10 computer cassette. Specially assembled in ENGLAND to give you superb performance time after time in computer operation, screw assembled for long life.

1–4 tapes 75p each including VAT p&p 18p each
Lots of 5 tapes £3.73 including VAT p&p 55p each lot
With every lot of 5 tapes ordered you get ONE FREE C10 CASSETTE
From Watson Bentley, & Associates
21 Walders Road, Rustington,
West Sussex IIR225X

Please send me.....Lots/single of the C10 blank cassettes. I enclose cash/PO/CQ for £..... and understand that if I am not completely satisfied I may return the tapes within 14 days in good condition for a full refund of the tape price.

To .....
Address .....
Town .....
County .....
Post Code .....

"Inventing video games can't be a full-time job. -Can it?"

Yes. - If you have a genuine interest in computer games, and you know how to programme in Assembler, you might be just the person we're looking for to join one of our teams working on the creation, writing and development of new home entertainment programmes. You will understand their appeal, and will probably have your own ideas on improvements that could be made to games that you've seen and new themes that could be developed.

Our existing range already includes some of the most imaginative and sophisticated games on the market - games which have an educational value, which have been designed to test dexterity, reaction-speed, alertness and concentration, or which revolve round secret fantasies of becoming an ace pilot, a football superstar, the hero of a dangerous jungle adventure...

But, no one has yet set a limit on the possibilities of invention. And, the demand for new programmes is growing - fast. Even now, in the USA, computer games are almost as big an industry as records and feature films.

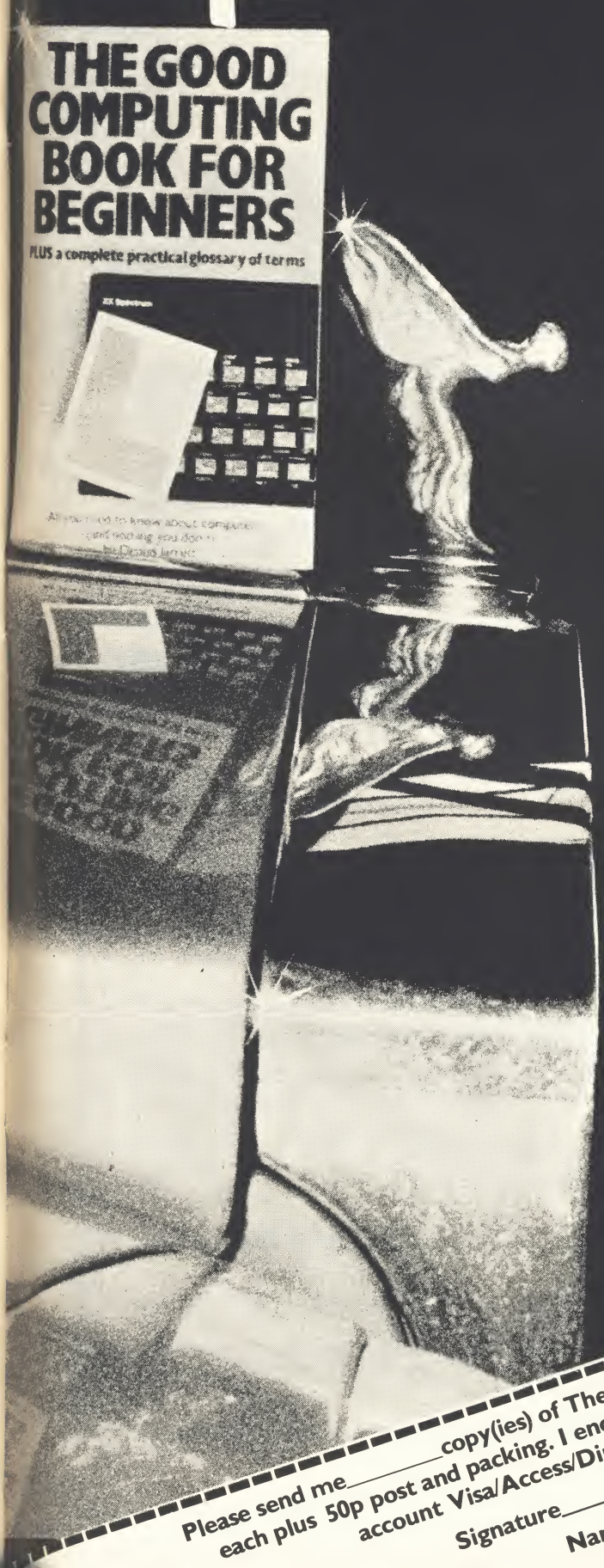
So, success will be very well rewarded with performance-related bonuses added to a competitive annual salary. And, as the division develops, there should be excellent opportunities for career progression.

To find out more, please telephone, Richard Gibson-Robinson, Software Development Manager, on 01-437 4393 (reversing charges if necessary) or write to him at THORN EMI Video Ltd., 5th Floor, Film House, 142 Wardour Street, London W.1.

Second Edition Just Published

If you only buy ONE computing book

THIS IS THE CLASSIC!



An entertaining, but **thorough** reference source with the most readable, comprehensive glossary you'll find anywhere. The Good Computing Book for Beginners is an essential A-Z of all the facts you need to know about computing — and none you don't!

Whether you're brand new to computing, or an old hand keen to stay ahead, you'll score by keeping this classic, top-selling book within reach to use again and again.

The author, Dennis Jarrett, is a successful journalist who was also founder editor of Which Computer? magazine — so his first edition quickly became a standard work. Now this new, substantially enlarged and revised edition covers the latest trends, terms and technology with the relevant facts — and ONLY the relevant facts — in **plain English.**

Here's another fact you'll find fascinating: it will only cost you £2.95!

Use the coupon below to get your copy right away — or buy it soon from your bookshop. It's the **one** book you'll turn to again and again.

Please send me____ copy(ies) of The Good Computing Book for Beginners by Dennis Jarrett at £2.95 each plus 50p post and packing. I enclose a cheque for____ / Please debit my credit card account Visa/Access/Diners/Amex number____

Signature____

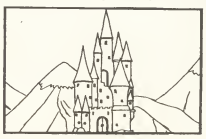
Name____ (please print clearly)

Address____

Send to: ECC PUBLICATIONS LIMITED
30-31 Islington Green
London N1 8BJ

sinclair supermart

DUNGEONS OF DOOM FOR ZX-81 (16K) £4.00



Can you explore the 1,000 locations in this addictive graphics and text adventure game for 1 to 6 players (ages 6 and over).

WOOSOFT
5 Andrews Close, Robertsbridge, Sussex TN32 5PB

2 — SPECTRUM GAMES

with speech, sound and graphics. (48k) Both on one tape for only £4.50

Hear your Spectrum talk with —
SPACE RESCUE, fight your way across the void to rescue your 3 comrades who are floating in space and put them back aboard their freight ship. (really two games in one) AND 3D PENALTY KICK, try your skill as goalkeeper in this game with full action graphics in 3D. Hear the abuse of the goal is missed completely.

Fast dispatch
Cheques and POs to:
B. W. Wright, 8 Thorncroft Road, Littlehampton, Sussex BN17 6DD.

HORNBY SOFTWARE

PRO GOLF Spectrum game, 16K and 48K. Realistic game. Highly popular. 9-hole course. Choose your own club, miss the bunkers, water, out of bounds. **£4.95 incl. p&p.**

TROON Spectrum game, 48K only. Highly skillful. 18-hole championship course with graphics. To any handicap. **£6.95 incl. p&p.**

FAMILY GAMES PACK including Sums (maths. aid), Pontoon, Greyhound, Parachutist and Rear Gunner. Spectrum 16K and 48K. **£4.95 incl. p&p.**

Hornby Software
21 Pinfold Hill
Leeds LS15 0PW.

LOCATOR

EDUCATION : ARCADE : MIND GAMES

Get all your **MAJOR TITLES** from **ONE** source. Largest selection available of **EDUCATIONAL** software from **JUNIOR SCHOOL** to **GCE** standard. **SAE** (9×4) for **CATALOGUE.** Some other **'SPECTRUM' TITLES** are:

CHESS	48K-ARTIC	£9.45
CHESS PLAYER	48K-Q-S	£6.95
TIMEGATE	48K-Q-S	£6.95
MINED OUT	48K-Q-S	£4.95
STAR TREK	48K-R+R	£4.95
MICRO CHESS	16K-ARTIC	£6.95
GOBBLEMAN	16K-ARTIC	£4.95
GOLF	16K-R+R	£3.75
SPACE INTRUDER	16K-Q-S	£4.95
METEOR STORM	16K-Q-S	£4.95
TELESOUND 84	COMPUSOUND	£9.95
BEEP BOOST RADIO	COMPUSOUND	£5.95

1 Cassette 35p, p&p: 2 Cassettes p&p **FREE.**
Mail order and local deliveries only.
Locator, 12 Fernhall Drive, Redbridge, Essex, IG4 5BN. Tel: 01-550 5575.

DON'T READ THIS

Unless you want a fast return of post service for Spectrum software **AND** a 5% discount. Most of the popular software stocked including:

The Hobbit £14.20, King Arthur £9.00, Black Crystal £7.12, Penetrator/Timegate/Football Manager £6.60 each, Slippery Sid/Syber Rats/Ground Attack/Orbitor/3D Tunnel, £5.65 each, Arcadia/Schizoids/Sorcerers Castle £5.25 each, 3D Tanx/Centipede/Volcanic Dungeon £4.75 each.

P&P 50p — free on 2 or more tapes also Add-ons, books, etc. Send large SAE or phone for price list.

IVYSOFT
91 Cleeve Drive,
Ivybridge
Devon
Tel: (07554) 4088.

48K SPECTRUM UPGRADE KIT

For only £24.50 inclusive
(Series 2)
Using genuine TMS I.C.s as used by Sinclair. Fits completely within Spectrum case.
LEBA ELECTRONICS
8 Denson Drive, Deeside, Clwyd CH5 3RG.
Tel: (0244) 534618/534459

ZX Spectrum—CP48 32K Memory Extension

Gives total of 48K. Simply fits internally on series 2 models with no soldering. Similar to competitors but only £24.50. Fitted by our engineers (dont send power supply) £31.50.

Citadel Products Ltd
Dept. SU, 50 High Street, Edgware, Middlesex, HA8 7EP. Tel: 01-951 1848

FOR HORSE RACING ENTHUSIASTS

'THE SETTLER'

Work out your winnings on accumulators, yankees, trebles etc. Available on cassette for ZX81 (16K) or SPECTRUM. Includes the professionally used **SAFE BET SYSTEM** and also the **NEW FORMULA STAKING PLAN** at no extra cost! (Both these plans have been advertised in the S.C.H.B. for two years at £27.) This whole package for only **£10.**

Also available; the highly successful **'POOLS FOR PROFIT'** system. NOT a forecasting program but a highly ingenious mathematically stratified method of entry. Complete checking program on cassette and full instructions etc. Price **£10.**

IMPORTANT — these are NOT games

But programs to help you earn money for a change. Mail remittance to:

BRITISH SPORTING SERVICES, (SU)
45 Sandringham Road, Norwich

FOOTBALL POOLS PROGRAM

- Lists out, in order of preference, the 16 most likely score draws, also the 16 most likely homes, draws and aways.
- Picks out the results on the bookmakers' FIXED ODDS coupons that have been given over-generous odds. Calculates your expected profit!
- Allows the user to update the tables week by week as the results come in.

This programme is available on the ZX-81 (16K) and ZX Spectrum (48K only)

For a copy of the program on a quality cassette, plus an information leaflet giving a brief explanation of the theory, send £5.95 to:

HARTLAND SOFTWARE
(DEPT.S), 8 PENZANCE PLACE, LONDON W11 4PA.

CASHCALC SPECTRUM 48K

Personal "grid type" cashflow planner. Easy to use ★ ready-to-go example plan. Just enter your own row headings/data. Menu based ★ single key commands. 18 categories and 12 months. Monthly totals and b/f and c/f balances. Cumulative display and summary options.

Only £6.95 inc ★ Cheque/Access/Barclaycard. Or available from the Bigger Micro Shop.

WIZARD SUPERSOFT
107 Broom Park, Teddington, Middlesex.

STOCK CONTROL 48K SPECTRUM

£14.95 from KEMP (incl P&P)

Easy to use menu driven system. Many features. Capacity 840–1,100 entries. Each transaction individually held with date, ref etc. Full audit trail. Input trapped and tested. Reorder levels. Full correct/delete facilities. Sale/verify routines, access routine, paged display, sorted stock lists etc, etc. Reviewed by accountant. Supplied with comprehensive 12 page manual.

Send cheques/PO's to Kemp Ltd, 43 Muswell Hill, London, N10 3PN. Europe +£1, Other +£1.50.

SHOPPING LIST PROGRAM

For use on ZX81 (16K) or Spectrum (16/48K) with ZX Printer

This useful program contains a comprehensive list of typical shopping items. Menu-driven, with full user facilities to list, print and add items. Easy to use. Supplied on quality cassette with instruction sheet.

Send cheque/PO for £5.50 (stating machine type) to:

SD MICRO-SYSTEMS
PO BOX No 24
HITCHEN, HERTS SG4 0AE

WORLD INFO a database of information about the modern world. Use your 48k Spectrum as a reference book on Heads of State, Wars, Types of Regime, Human Rights and much more. Its a datafile for use with Campbell Systems Masterfile, the standard database system for Spectrum. £5. Send SAE for more details.

PHONES keeps track of your phone bill. Times calls, costs them. Good for flat sharers or several people sharing the same phone. £4.50 From WIMSOFT, 20 Brookside Road, Wimborne, Dorset BH21 2BL.

TO ADVERTISE IN THE SUPERMART CALL ANNETTE ON 01-359 7481 NOW!

ZX81 SPECTRUM, DRAGON, BBC AND VIC SOFTWARE LENDING LIBRARY

We have for hire from 50p (inc. post) programs for your computer.

£5 life membership (less than the cost of a single game) brings you the SOFTWARE LENDING LIBRARY membership kit, catalogue and news letter.

Send cheque or PO for £5 to:
SOFTWARE LENDING LIBRARY
PO Box 3, Castleford, West Yorks
Starting name, address and computer type.
All tapes used with manufacturers' permission

ZX80/ 81 NANOS Quick Reference Cards

Why waste time and frustration struggling with the books? this card has it all. "There is nothing like it in the world".

Send £3.50 per card to
ELKAN ELECTRONICS,
(Dept. SU)
FREEPOST, 11 Bury New Road, Prestwich, Manchester M25 6LZ
or tel. 061-798 7613 (24 hours)
— other Sinclair items also available —

FIREWORK MUSIC

An educational game for the **16K Spectrum,** designed to develop speed in music reading. Players learn to read notes in the treble and bass clef while they enjoy an attractive game with colour graphics and sound. There are firework displays as rewards but your firework box is blown up by falling sparks if you're too slow. Pace increases with score to encourage quick reading. Ideal for home or school use by music beginners, 2 programs on cassette, for **16K Spectrum** (or a similar **16K ZX81** version) cost only **£5.00.**

SOFTWARE COTTAGE, 19 Westfield Drive, Loughborough, Leics. LE11 3QJ.

ANVIL COMPUTING

SUPERB NEW SELF TEACH PROGRAM
For ZX-81 (16K). Spectrum. TRS80. Video Genie.

• Now you can learn basic fast and efficiently•
•Forget your past programming problems. This program will make it all clear•

Covers Arrays, Sorting, Searching, Counting, Decision making tests, Error Trapping, Menu driving etc. You start with short simple programs and build up to full working programs with everything explained in full, precise detail.

•This is *NOT* a program you simply copy and run.• ••*YOU HAVE GOT TO WORK!*•• But it is written in such a way that you can not get stuck.

This program has been fully tested over the past six months by 50 domestic and small business users and we have not received any adverse reports.

This program is our own product and is not available from any other source. Full money back guarantee. **£4.75** incl Postage & Package (state which computer).

51 Whitcliffe Lane, Ripon, Yorks HG4 2LB.

48K SPECTRUM
Colour and Moving Graphics

O LEVEL PHYSICS

- Solids, Liquids and Gases
- Vectors and Scalars
- Acceleration
- Graphs of Motion
- Gravity, Weight and Friction
- Newton's Laws

6 PROGRAMS FOR £6.50

Cheque/PO to **THINK TANK**
Dept. SU(S), 35 Wellington Road, Wimbledon Park, London SW19 8EQ

OTHER TITLES COMING SOON

PROGRAMMES FOR 2-7 YR OLDS

Educational games for pre-school and primary children for the Spectrum with full colour animation and sound.

COUNTING: 4 graded programmes. Good as a first introduction to numbers.
ALPHABET: Pictures for each letter, with an option to present lower case letters. (16K or 48K—please specify.)
SHAPE SORTER: 3 programmes to aid shape recognition, observation and size sorting.
ADDING & SUBTRACTING: 3 animated programmes from a very simple level.
All tapes **£5.25** from

WIDGIT SOFTWARE
48 Durham Road,
London N2 9DT.

(All tapes 16K unless otherwise specified)

Erricks' of Bradford
ZX-81/PERIPHERALS/
SOFTWARE
All from stock
Rawson Square.
(Bradford) 309266

ZX-81 REPAIR SERVICE
At last no need to wait for weeks, send your faulty ZX-81 for a fast reliable repair.
We will repair any ZX-81 kit or Ready Built Unit.
Please describe the fault briefly and send a cheque/postal order to:
NEXT COMPUTER SYSTEMS
88 Harvest Road
Englefield Green
Surrey TW20 0QR
ONLY £15.95 + p&p £1.75
fully guaranteed.

MACHINE CODE. If you are at all interested in learning more about this invaluable tool, then join the ZX Machine Code Users Club. Send **£1** for trial issue of club magazine **Micro Arts** to: Toni Baker, 5 Dumergue Ave, Queensborough, Kent ME11 5BT. Cheques payable to Micro Arts.

JUPITER ACE USERS CLUB
Newsletter, software (both games and utilities), adapter for ZX81 add-ons.
SAE for details.
Remsoft, 18 George Street, Brighton BN2 1RH

ZX-81, 16K plus 13 cassettes (games and educational), pocket book, machine code book, bargain at £135. Telephone: Berkhamsted (04427) 6416.

16K ZX81. As New, manual, leads included plus 4 cassettes: Asteroids, Defender, Island and Star Trail, worth over £100, **Bargain** at **£80**. C. P. Harris, 2 Park View, Railway Side, Barnes SW13 0PH.

High resolution graphics for Sinclair ZX81 1K without hardware! Tape and instructions only £3.99. P. Moody, 1 Benson Street, Cambridge.

16K ZX81 Data File giving **96K** equivalent storage capacity. Features include: index, list, auto file. C60 cassette & manual, £7.50. MP 3 Pine View Close, Haslemere, Surrey GU27 1DU.

T.J.C.H. SOFTWARE: Phoenix Tower: Battle your way up the 15 levels of the Phoenix Tower, find the jewel and escape. The 16k ZX81 £2.50. 53 Grandville Road, Northchurch, Berkhamsted, Herts HP4 3RN. Tel: 04427-73337.

SPY CASSETTE. Enables you to stop, list or copy any cassette. Send just £3. Please state if for ZX81 or Spectrum. Bobker, 29 Chadderton Drive, Unsworth, Bury Lancs.

SPECTRUM 16K. Software **games tape 1**—Moon Fight, Ski-Run, Las Vegas, Nasties; **games tape 2**—Kong, Mazeing, Caverns of Camak, Snake £3.95 each. Sospan Soft, 1 Warborough Close, Llanelli, Dyfed.

DIGISOFT 16K SPECTRUM SKYRAIDER. Fast arcade action. Fly your bomber dropping bombs and firing missiles to destroy the enemy city. Cheques for £4.95 to C. M. Smith, 11 Norfolk Rd, Harrogate NG2 8DA.

16K SPECTRUM GAMES PACK One, includes Stepping-stones, Siege, Ski, Derby, Slime, Cave-attack, Rat-Trap. Part machine code on quality cassette for only £2.50. Andrew Burnham, 126 Woodlands Rd, Little Bookham, Surrey KT23 4HJ.

48K SPECTRUM. Only 4 weeks old, original box, used for 2 hours only, c/w leads, manuals, etc **£130 ono.** 021-705 4624 day, eves. Meriden 23026.

TEACHER. Use your Spectrum **Teacheraid** 16K, **Teachdata** 48K Classlists, Statistics, Graphs, Sorts, Manipulates names, marks, grades. Genuinely useful 16K £3.80, 48K £5.20. Mr. B. Farris, 8 Thompson Rd, Bolton.

BRIDGE CASSETTS FOR ZX SPECTRUM. £3 each. Beginners or advanced. Send PO, cheques to M. Blythe, 235 Birmingham Rd, Sutton Coldfield, West Midlands B72 1EA. Suitable for 16K or 48K.

PRE-SCHOOL/EARLY SCHOOL CASSETTE suitable schools/home. 8 educational/stimulating programs for children 3–10yrs. **Written by teachers.** 16/48K Spectrum. £5 cheque/P.O. to Essex Software, 16 Huntsman's Drive, Upminster, Essex. Tel: UPM 20508.

SUPERB 3D STRATEGY GAME 16K/48K SPECTRUM. Multilevel, fully machine coded and very very challenging: almost impossible to outplay. All instructions supplied. Unbeatable at £4.95 (limited offer) Supersoft, 91 Manor Road, London E17 5RY.

SPECTRUM "GORILLA". A new, high resolution game. Can you control your tribe of gorillas? Send £3.99 payable to David Hornsby, 26 Cavendish Cres, Hornchurch, Essex RM12 5NT. Package and posting free.

RAMOPOLY 48K SPECTRUM. Variation on Monopoly. Superb graphics/sound. Easy to learn, impossible to master. Also Pontoon double loaded cassette. Send £3.50 cheque/PO. J. Fletcher, 29 Samuel St, Warrington, Cheshire.

48K SPECTRUM Cheeky Chimp, Specman, Spectral Panic, £4.95. Berserker, Frogger—£4.95. All games include **advanced** features and **amazing graphics**. Cheques to **S Culley**, Long Acre, Epperstone Rd, Lowdham, Notts. **Fast** delivery.

HIGH RESOLUTION INVADERS FOR 16K ZX-81

No its not a printing error! We utillise a **SOFTWARE ONLY** technique developed by Steve Briers BSc to produce a stable 248 by 224 pixel display.

ABSOLUTELY NO HARDWARE MODIFICATIONS, ARE REQUIRED.

This is the only program that can achieve this without using expensive add-ons. But the graphics are just one feature from a long list:

- Game options — one or two players — taking turns or playing simultaneously!
- Adjustable bomb dropping and missile firing rates.
- Advanced keyboard scanning routines to aid game playing.
- All options selectable under program control (no POKEing around).
- Game can be stopped at any time.
- Three types of invader with graded scoring in a 5 × 11 array.
- Saucers appear at intervals.
- Protective shields.
- Difficulty increases as game progresses.
- Base explosion effect when hit.
- Uses 99% of available memory.
- Recorded twice on a high quality cassette.
- Instructions on how to load and play the game included.
- Only £4.95 from

ODYSSEY COMPUTING
28 BINGHAM ROAD,
SHERWOOD,
NOTTS
NG5 2EP

SO YOU THINK YOU CAN WRITE COMPUTER GAMES?

— If you can write good computer games for the SPECTRUM, prove it to us and you could collect a substantial cash payment for the distribution rights of your game.

— Send us your programme and our experts will assess its potential, and providing it meets with our high standards, we will incorporate it into our arsenal of top computer games.

Who knows, if you are good, you could be asked to join our team of programmers here at:

FUSION SOFTWARE

27 Hither Chantlers, Langton Green, Kent

Author's name: .....

Address .....

.....

.....Tel: .....

Loading instructions: .....

Game instructions: .....

Please tick: ☐16K ☐48K

FREE THIS MONTH

There's a gift for you with the May issue of **Sinclair Programs**— *a free computer cassette!*

This high-quality recording medium is made by a top manufacturer—and there's a *free* one for *you* on the cover of **Sinclair Programs** in May!

But remember—**Sinclair Programs** *will sell out even faster than usual.*

Make sure someone else doesn't get there first: tell your newsagent *now* to order your **Sinclair Programs** for May. And don't miss out on *your* free cassette!

Sell your used computer or peripherals through Sinclair Supermart at low cost... up to 30 words for only £5.

Have you updated your computer or do you no longer use that add-on? Instead of leaving it lying around, turn it into cash be placing a classified advertisement in Sinclair Supermart and reach around 65,000 users of the Sinclair ZX systems. Please write your advertisement in the boxes below, one word per box. Underline words required in bold type. Your name, address and/or telephone number should be included *Please print in block capitals.*
Note—this service is open only to private advertisers. The advertisement will appear in the earliest possible issue.

Name:.....

Address:.....

..... Tel:.....

Have you included the fee of £5?

Conditions
The Advertisement Manager reserves the right to alter, reject or suspend an advertisement without assigning any reason. Advertisements are accepted subject to approval of copy and to the right of the Advertisement Manager to alter, reject or cancel any order without explanation. The Proprietors are not liable for any loss from any cause whatever, nor do they accept liability for printers' errors. The Advertisers shall indemnify the Publishers in respect of any claim, cost and expenses arising out of any libellous or malicious matter or untrue statement in any advertisement published for the advertisers, or any infringement of copyright, patent or design therein. The placing of any order will be deemed to be an acceptance of these conditions.

MAIL ORDER ADVERTISING

British Code of Advertising Practice

Advertisements in this publication are required to conform to the British Code of Advertising Practice. In respect of mail order advertisements where money is paid in advance, the code requires advertisers to fulfil orders within 28 days, unless a longer delivery period is stated. Where goods are returned undamaged within seven days, the purchaser's money must be refunded. Please retain proof of postage/despatch, as this may be needed.

Mail Order Protection Scheme

If you order goods from Mail Order advertisements in this magazine and pay by post in advance of delivery, *Sinclair User* will consider you for compensation if the Advertiser should become insolvent or bankrupt, provided:

(1) You have not received the goods or had your money returned; and

(2) You write to the Publisher of *Sinclair User* summarizing the situation not earlier than 28 days from the day you sent your order and not later than two months from that day.

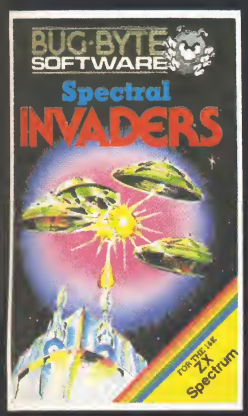
Please do not wait until the last moment to inform us. When you do write, we will tell you how to make your claim and what evidence of payment is required.

We guarantee to meet claims from readers in accordance with the above procedure as soon as possible after the Advertiser has been declared bankrupt or insolvent (up to a limit of £4,250 per annum for any one Advertiser so affected and up to £10,000 per annum in respect of all insolvent Advertisers. Claims may be paid for higher amounts, or when the above procedure has not been complied with at the discretion of *Sinclair User*, but we do not guarantee to do so in view of the need to set some limit to this commitment and to learn quickly of readers' difficulties).

This guarantee covers only advance payment sent in direct response to an advertisement in this magazine (not, for example, payment made in response to catalogues etc, received as a result of answering such advertisements). Classified advertisements are excluded.

Advertisement Index

AGF Hardware 95
ASP Exhibitions 51
Abersoft 81
Adapt Electronics 22
Addictive Games 8
Afdec Electronics Ltd 71
Artic Computing 70
Bellflower Software 98
Buffer Micro Shop 99
Bug Byte ..... IBC
CCS 26
CP Software 67
Calpac 99
Campbell Systems 16
Carnell Software 19
Cascade Software 16
Century Publishing 43
Cheetah Marketing 69
Computer Add-Ons 25
Computex Cases 82
Crystal Computing 80
DJL Software 40
DK'Tronics 38, 39, 76, 77
Digital Integration 52
Docimodus 92
East London Robotics 25
Educare 91
Felix Software 81
File Sixty 31
Mr. A. Firminger 110
Foilkade 106
P. Furlong Products 68
Fusion Software 113
Dr. K. W. Glasson 74
Graham Brown & Co 98
J.K. Greye Enterprises 74
Guildhall Computer Stationery 106
Hestacrest 81
Hewson Consultants 40, 41
Hilton Computer Services 68
Interface 34
JRS Software 12
Kayde 42
Kempston ..... IFC, 26, 50
Linsac 22
Maplin 100
Martech Games 91
Melbourne House Publishers 78
Memotech 32, 33
Micro Power 15
Microl 96, 97
Microsphere 106
Microtext (UK) Ltd 86
Microware 12
Mikro Gen 51, 67
Morex 50
Myrmidon Software 92
National Extension College 110
Neptune Computing 69
Newnes Technical Books 110
Newsoft 80
Northern Premier Exhibitions 108
Notting Dale Technology Centre 34
Odyssey Computing 113
Oxford Computer Publishing 91
PSS 30
Phipps Associates 8
Picturesque 8
Print & Plotter 4
Quicksilva ..... OBC
R & R Software 22
Ram Writer 106
Rose Cassettes 92
Scientex 69
Silversoft 20, 21
Sinclair Research Ltd 84, 85
W. H. Smith 6, 7
Softeach 46
Software Express 35
Software Farm 40, 92
Software Supermarket 11
Stellar Services 16
Stonechip Electronics 15
Supermart 112, 113
Tasman Software 86
Thorn EMI 108
Timedata 26
Transform 98
UTS 25
University Software 86
Video Software 98
W. B. Associates 108
Warp Factor Eight 51
Which Micro? 104, 105
Winters Ltd 74
Work Force 52



SPECTACULAR!

BUG-BYTE SOFTWARE

Selected titles available from larger branches of Boots and W.H. Smith, Spectrum, Laskys, Currys Micro-C and all good Computer Shops. Also by mail order from Software Express.

SPECTRUM & ZX81 GAMES FROM QUICKSILVA

A WHOLE GALAXY OF ACTION AT YOUR FINGERTIPS

SPECTRUM SOFTWARE

TIME-GATE
4D Space/time adventure in fast moving graphics. 48K.
Author: **John Hollis**

THE CHESS PLAYER
With Speech and personality. 48K.
Author: **Martin Wren-Hilton**

METEOR STORM
With speech and Hi Res Graphics. 16K or 48K.
Author: **John Hollis**

SPACE INTRUDERS
With mutants and Hi Res Graphics. 16K or 48K.
Author: **John Hollis**

EASYSPEAK
Add speech or music to your programs. 48K.
Author: **John Hollis**

MINED-OUT
With 9 levels of minefield. 48K.
Author: **Ian Andrew**

SOFTWARE FOR THE ZX81 WITH 16K RAM

QS ASTEROIDS
"...very good..."
"...addictive game!"
(C. & V.G.).
Author: **John Hollis**

QS DEFENDA
"...better than any other arcade game I've seen."
(Sync.).
Author: **Nick Lambert**

QS SCRAMBLE
"...amazing, fantastic!"
(P.C.W.).
Author: **Dave Edwards**

QS INVADERS
"...just like the real thing!" (C. & V.G.).
Author: **Dave Edwards**

MUNCHEES
Features 1 to 4 Ghosts, 3 Munchees, Power pills
Author: **A. Laird**

GALAXIANS & GLOOPS
Features two types of swooping Galaxian.
Author: **T. Beckwith**

CROAKA-CRAWLA
With Frogs, Lorries, Logs, Crocodiles, Turtles, Flies.
Author: **John Field**

NEW RELEASES FOR THE ZX81 & SPECTRUM

SPECTRUM

FRENZY
Arcade action
Features: Full colour hi-res graphics, sound, high score table, hold feature, 5 levels of robots, Evil Orville the minelayer, exploding pods, progressive difficulty, attract mode.
Author: **David Shea**

ASTRO BLASTER
Arcade action
Features: Full attract mode, 5 attack waves, 15 levels of difficulty, rapid fire, meteor storms, changing aliens, plasma bolts, killer bombs, full colour hi-res graphics, full sound.
Author: **John Edwards**
16K or 48K Spectrum

EDDIE A WORD PROCESSOR
Features:
Menu driven prompts given at all times.
Drastic commands — e.g. Clear Text — are automatically questioned.
Load/save commands... all text justified, on screen as well as printer.
Author: **P. Baker**
48K Spectrum

PIXEL GAMES FOR THE ZX81 WITH 16K RAM

TRADER
A trilogy of 16K programs that combine to give an epic 48K graphic adventure. As a galactic trader, you deal with some very bizarre customers indeed.

STOP PRESS
Trader now available for the Spectrum £9.95

SUBSPACE STRIKER/ZOR
With your deadly antimat torpedoes, you unleash havoc in the Federation's Spacelanes.

STARQUEST/ ENCOUNTER
With the help of your onboard computer you seek a habitable planet amidst the perils of deep space.

ZX81 GAMES

OCEAN TRADER
An adventure set in the 19th Century.
You own and captain a vessel, sail between 5 ports and deal in coal and whisky; with storms, pirates, sea mist and vessels adrift.
Author: **A. Morgan**
ZX81 with 16K RAM

COSMIC GUERILLA
Arcade action
Fast m/c action, will drive QS sound and character boards, responsive controls, high score tables.
Author: **C. K. Tame**
ZX81 with 16K RAM

3D BLACK STAR
Arcade action
Features: Fast 3D graphics, fast scoring, four types of target. Eight instrument displays, warp drive, resurging aliens, time limit, 17 levels of progressive difficulty, high score table.
Author: **M. Sudworth**
ZX81 with 16K RAM

DAMPER & GLOOPER
Arcade action
Features: Fast action, 5 dampers increase to 6 on later phases, 3 lives plus bonus lives, ever increasing speed, high score, stall frame features, spiral clear at end of games, bonus phase worth 5000 pts., high score save and display.
Author: **P. Crane**
ZX81 with 16K RAM

PIONEER TRAIL
A western adventure
Features: 20 levels of play. "Mind Game" plus shooting rifle speed uses all keys and is measured against the players personal average response. This game is based on historical data.
Author: **Marion Stubbs.**
ZX81 with 16K RAM

Quicksilva Limited,
Palmerston Park House,
13, Palmerston Road,
Southampton. SO1 1LL.
Telephone: (0703) 20169.

SPECTRUM GAMES

Time Gate	£6.95 ☐
Frenzy	£4.95 ☐
Mined-Out	£4.95 ☐
Easyspeak	£4.95 ☐
Astro Blaster	£4.95 ☐
Meteor Storm	£6.95 ☐
The Chess Player	£4.95 ☐
Space Intruders	£5.95 ☐
Eddie A Word Processor	£9.95 ☐
Trader	

PIXEL GAMES FOR ZX81

Trader	£9.95 ☐
Subspace Striker & Zor	£3.95 ☐
Starquest & Encounter	£3.95 ☐

ZX81 GAMES

QS Asteroids	£3.95 ☐
QS Defenda	£3.95 ☐
QS Scramble	£3.95 ☐
QS Invaders	£3.95 ☐
Croaka-Crawla	£3.95 ☐
Galaxians & Gloops	£4.95 ☐
Munchees	£3.95 ☐
Black Star	£4.95 ☐
Cosmic Guerilla	£3.95 ☐
Damper & Glooper	£4.95 ☐
	£3.95 ☐
Ocean Trader	£3.95 ☐
Pioneer Trail	

Total cheque/PO. enclosed ..... Cheque payable to Quicksilva

Name _____

Address _____

Please send me the games as ticked. Supplied on Cassette

Send order to:
Quicksilva Limited, Palmerston Park House, 13, Palmerston Road, Southampton.

WARNING: These programs are sold according to QUICKSILVA Ltd's terms of trade and conditions of sale. Copies of which are available on request.